THE Chemical Age

VOL. LXXII 9 APRIL 1955 No. 1865

392

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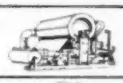
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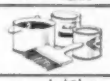
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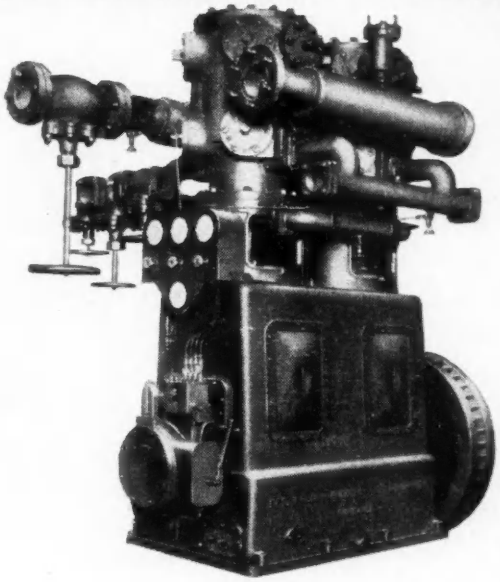
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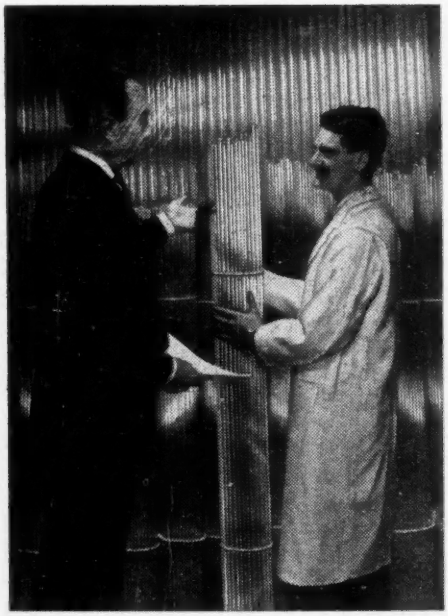
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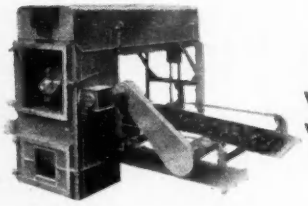
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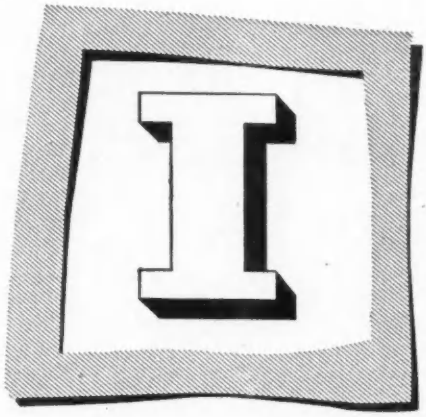
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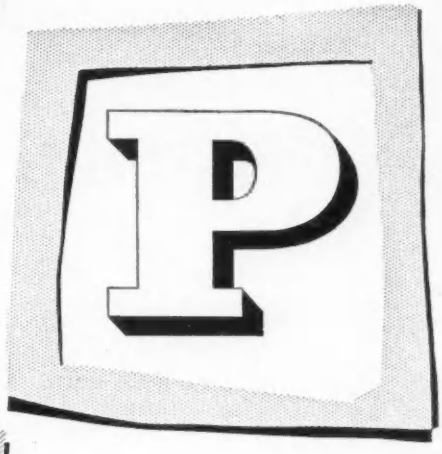
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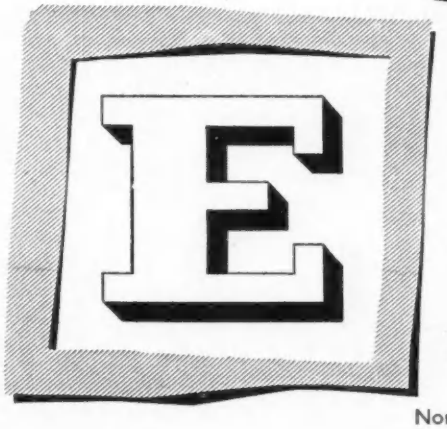
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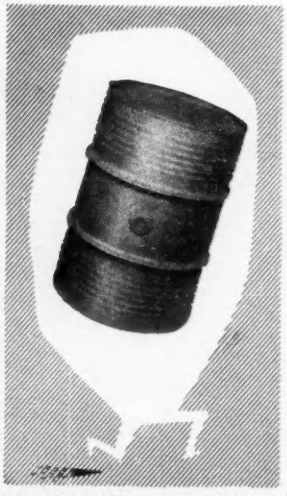


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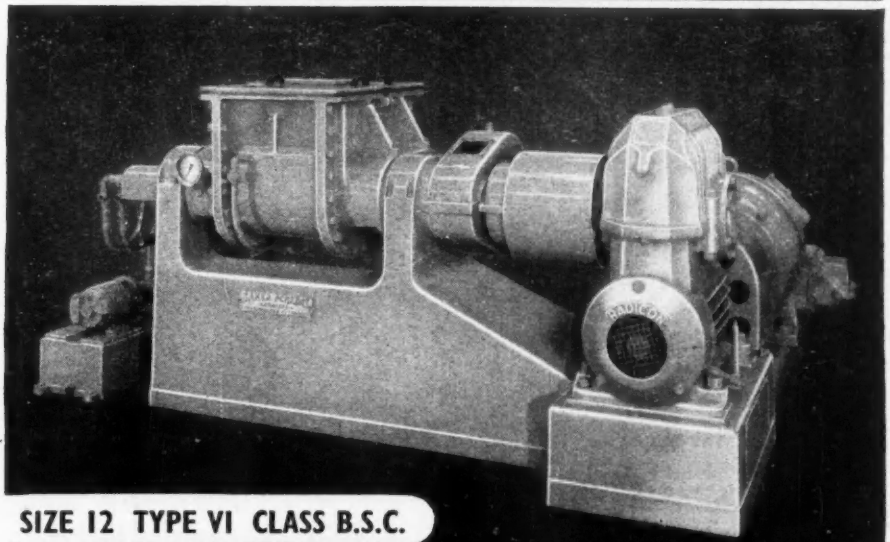
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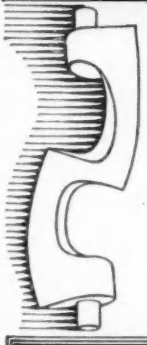


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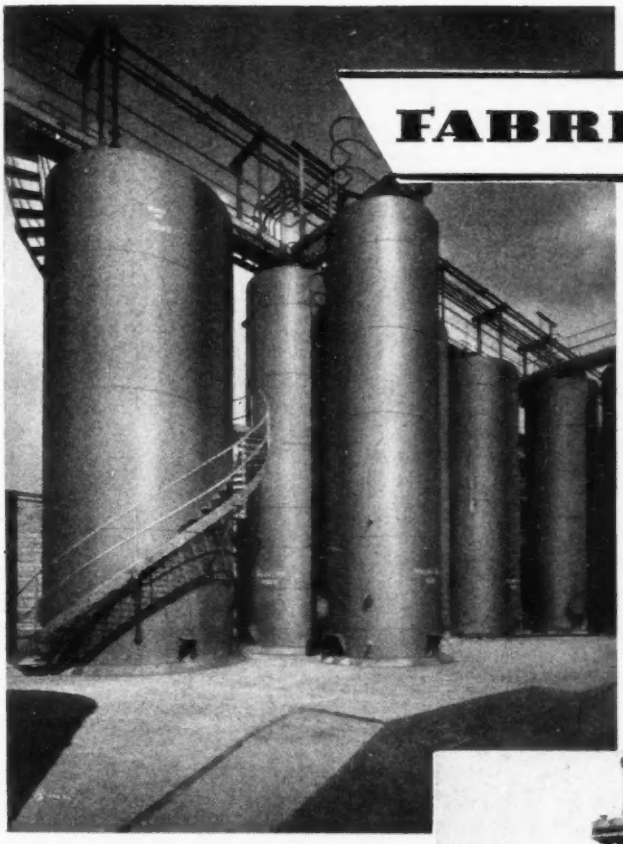
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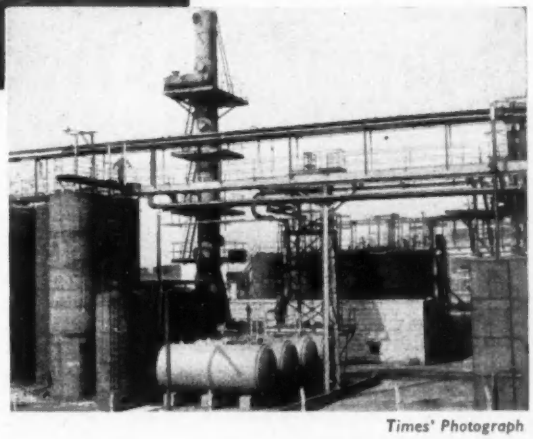


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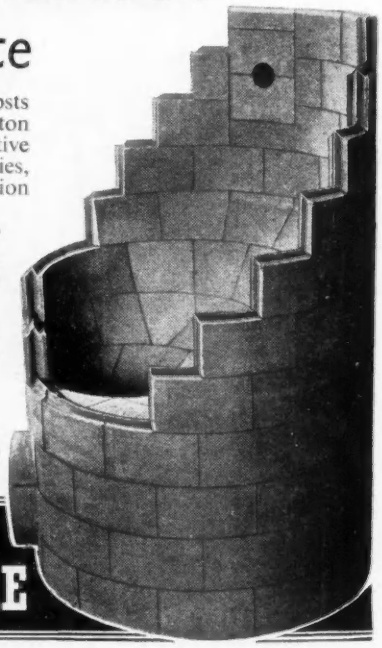
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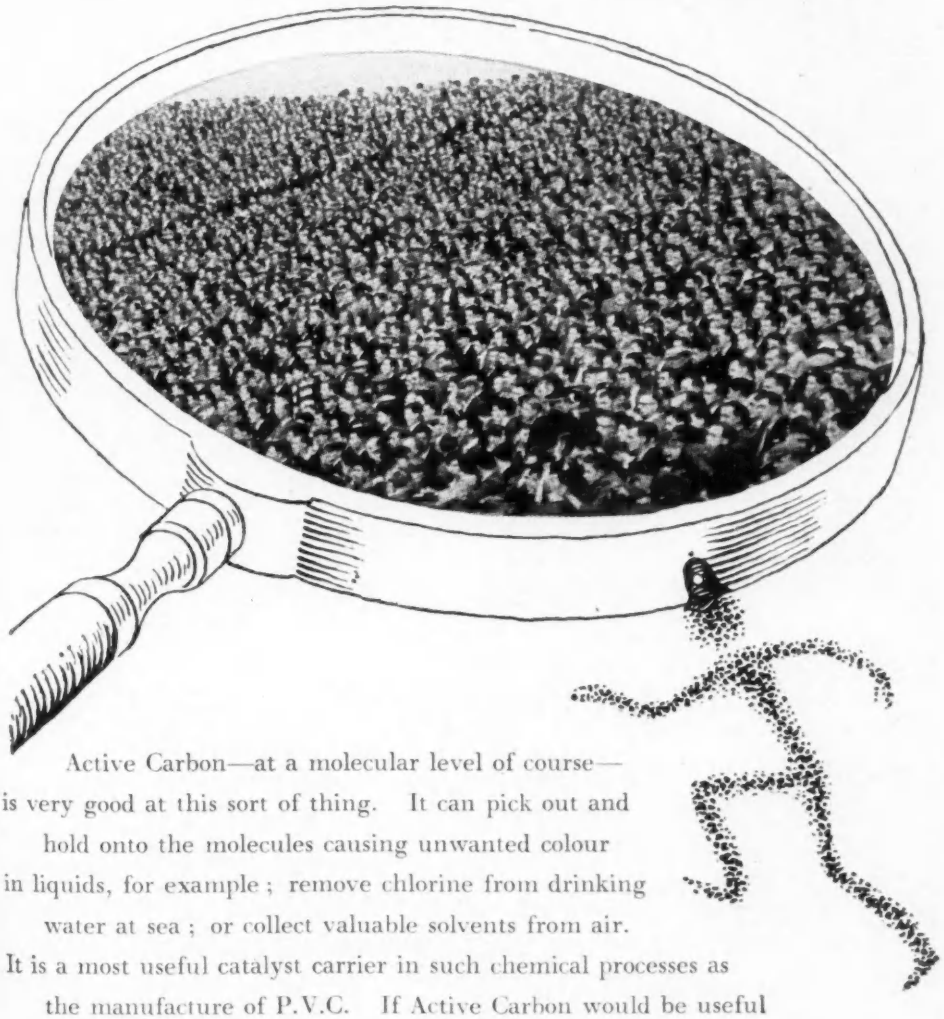
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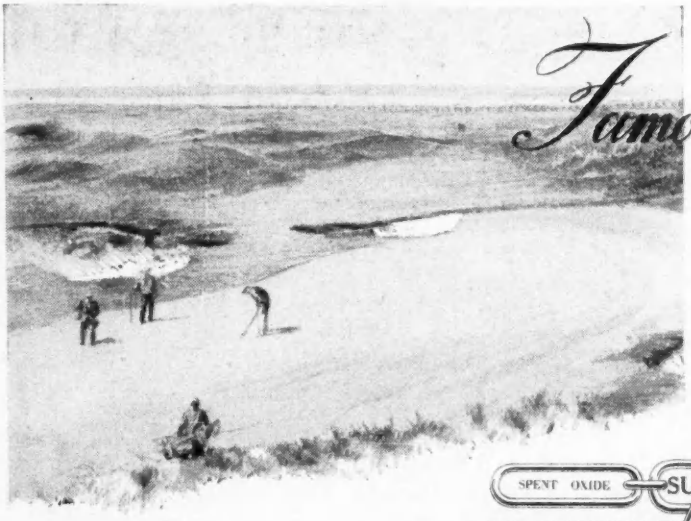
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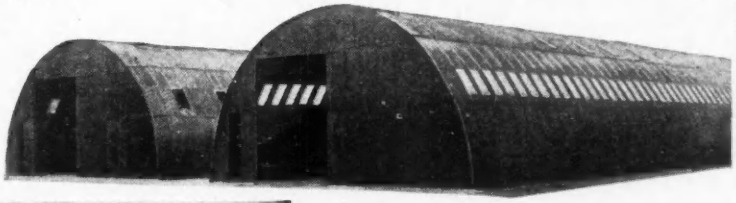
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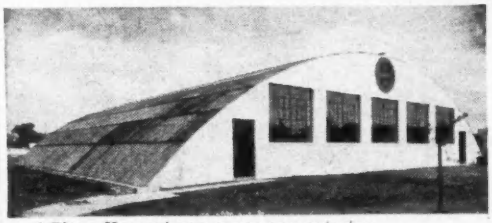
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CONTENTS . 9 APRIL 1955

The Chemical Society's Anniversary Meeting	843
Polymers from the Oxides of Carbon	845
Simp'e Shielded Micro-Burner	847
Institution of Chemical Engineers' Examinations	850
Domestic Water Treatment	851
Information Should Be Shared	852
Russian Petroleum 1954-1955	853
Shawinigan's Annual Report	855
The Chemist's Bookshelf	857
Home News Items	859
Overseas News Items	860
Personal	861
Monsanto Mexicana	863
Publications & Announcements	864
Law & Company News	868
Next Week's Events	869

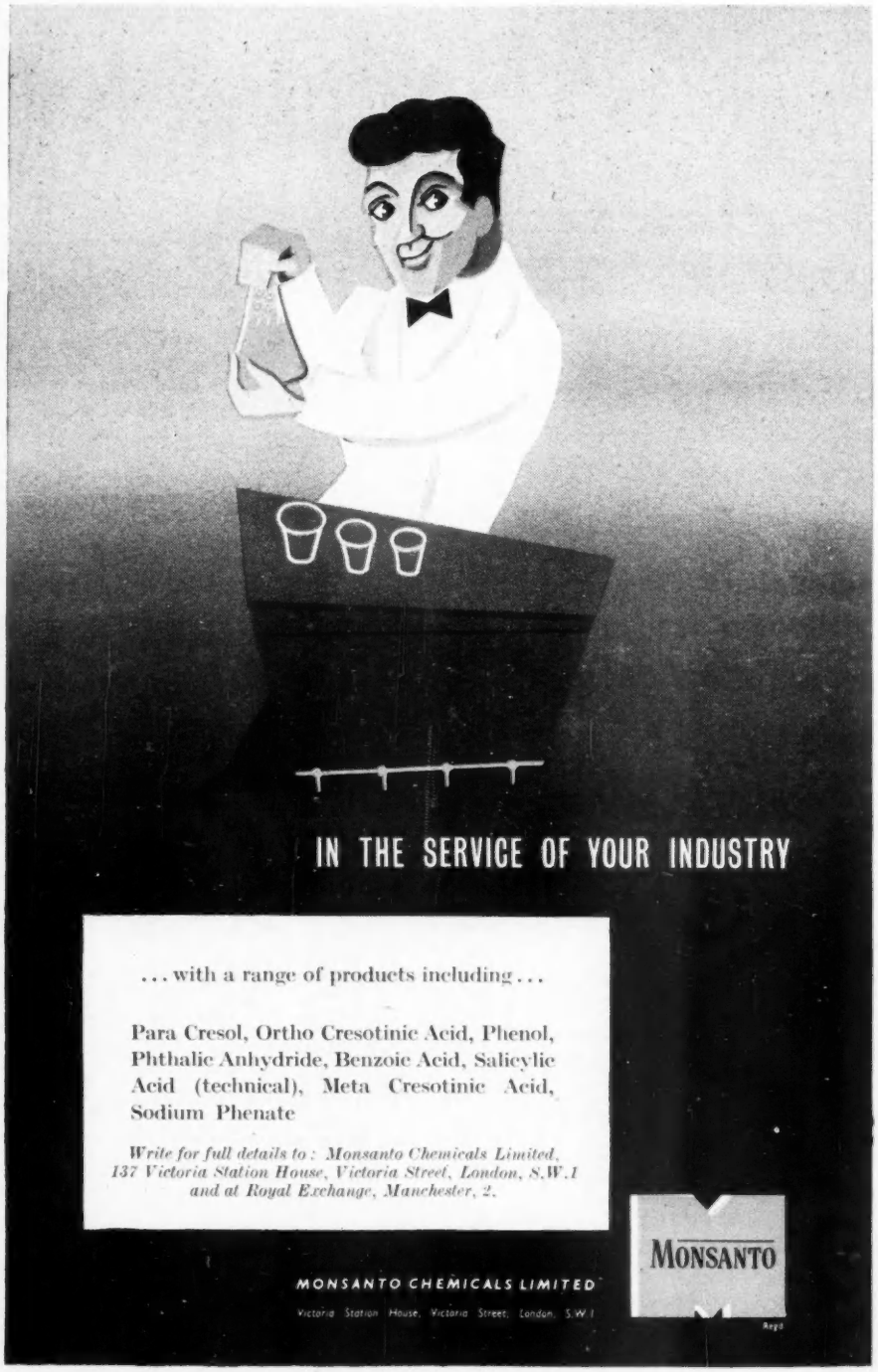
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Pegs & Holes

HOW many scientists can be spared for directing and managing industry? How many graduates in science can we afford to utilise in such technico-commercial careers as selling and consumer-service? These questions were forcibly raised by our esteemed contemporary, *Chemistry & Industry* (1955 [13], 331) in a recent leader. If, of course, the supply of scientists each year was equal to the total demands from research, industry, government departments, and schools, these would be futile questions. By ordinary laws of economics all the holes would gradually get pegs of the right shape. However, that basic condition of balanced supply and demand does not exist, nor is it likely to exist within any foreseeable future. There is an old saying that satisfaction is death; it may be worth remembering. Is progress ever made when a state of balanced supply and demand—whether for special skill or some material—is reached? It is the pressure of disequilibrium that provides force and change.

Those who doubt the wisdom of allowing scientists to leave laboratories and enter top-level offices seem to regard these changes of function as forms of wastage. On the contrary, the current trend for more scientists to appear as managers and directors in industry can continue for another ten or twenty years before it is open to charges of wasting talent or energy. No country has wasted scientific opportunity on a more lavish scale than Britain; time and time again fundamental work on great new scientific developments has been initiated here, yet other countries have reaped the harvest. There has never been a period when the flow of ideas from laboratories has not exceeded the nation's capacity and willingness to exploit them. Even the time-lag between research and its actual application represents far more wastage than has ever been involved in using good scientists as administrators.

Our contemporary shares this view, remarking that 'it seems certain this practice has greatly strengthened our industry'. But in asking whether we can 'afford this drain upon our resources' (of trained scientific man-power), the opinion is reached that it depends upon the man himself, that the utilisation of scientists will settle itself according to the possession by individuals of gifts for research or for management, and that there will be few Jekyll and Hyde cases. Here we must certainly dissent. We see no reason why a man of scientific training and talent should not make valuable research contributions in the earlier phase of his career and turn subsequently to management or administration. Indeed, this has happened sufficiently often, and with success in both, for it to be a matter of fact. A quotation used in our

contemporary's leader says, with a dogmatism that is hardly convincing, 'it is almost certainly impossible to teach advanced management to anyone over 35'. In branches of industry where hitherto management has been devoid of scientific influence, what can be called 'advanced' management will not represent the only prescription for improvement; the introduction of a humbler-styled standard of management, but in which decisions are reached with some degree of scientific judgment and objectivity, can still increase efficiency. 'Advanced management' is a standard for organisations which are already large; in those organisations the transference of scientists from research to administration, whenever this occurs, is certainly an assessment of individual capacity. But in smaller organisations, in companies which employ hundreds rather than thousands, the dilemma of 'office-or-laboratory' poses itself with greater difficulty. In those circumstances, a scientist can indeed make important contributions both to research and to management. Moreover, it is in these smaller and medium-sized units of industry that the fuller influence of science is most needed and will for that reason pay the biggest dividends.

There is a school of thought which believes that the research worker's peak of originality has begun to fade by the age of 40 or thereabout. There is certainly a good deal of evidence to support this view, though at best it cannot be more than the usual rule with the usual exceptions. However, a man who has been in industry as a research scientist from the age of 25 to the early 40s may well by sheer contact and experience have acquired enough thoughtful experience of his company's problems and people to be able to approach the task of management with ideal maturity. His contribution for, say, a further 20 years of service may well prove much greater in management than it would have in continued research. Such a transference of function is not wastage; it can represent an efficient utilisation of human ability. *Chemistry & Industry* suggests that 'men who possess these gifts will be in such a small minority as to have little effect on the total numbers of our scientific man-power'. Here again we must dissent. While recognising the continuing existence of the type of scientist whose understanding of mankind in general is far too cold and narrow for management, we nevertheless believe that a sizeable proportion of scientists whose research has brought them into close contact with industry, whether from within or from outside, have at least as much starting capacity for management as most people who are managing industry today.

There is, perhaps misleadingly, a sharp disparity between the economic rewards of management and of research, and this has prompted many scientists to seek administrative posts. We agree with our contemporary that the chemist with good flair for research should have a standing and remuneration equivalent to those of the administrator. The disparity that now exists is not evidence that good administration is overpaid, but evidence that good science is underpaid. Nevertheless, economic equality cannot be too idealistically pursued. Salaries, above the basic scales of functional reward, are determined by the law of supply and demand. Good managers are well paid because they represent a human commodity that is not in easy supply. Scarce though scientists may be, a scientist who is also a man with managerial capacity is an even greater rarity. However, if more scientists turn towards management, as we believe to be both possible and necessary, the situation will tend to change, with good managers not as uncommon and good research scientists in lesser supply than now.

Meanwhile, of the trend for scientists to enter the field of direction and management, nothing is more applicable than Sir Winston Churchill's comment upon wartime Anglo-American co-operation, 'Let it flow'. Science is not primarily a specialised skill, it is an outlook of mind. In any case, the solution to scientific man-power problems in free and modern countries is not to be found in confining scientists to specified functions. The solution is far wider—to spend much more upon scientific education and to encourage everybody with any scientific aptitude to seek a scientific career.

Notes & Comments

Papers Without Pulp

THE title has nothing to do with the newspaper strike, which must, incidentally, have delayed the denudation of quite a number of acres of forestland. We refer to new types of paper now being developed on laboratory scale from synthetic fibres, from polyamides, polyacrylates, and polyesters. These new papers are already stated to be several times stronger than any papers that can be made from cellulose fibre, whether extracted from wood pulp or rag. Their resistance to light, bacteria and fungi, moisture, corrosive chemicals, etc., is also exceptional. It is unlikely, of course, that papers of this kind will compete economically with ordinary paper in the everyday, general purpose market. Their hope of commercial development depends upon special uses—for example, high-strength, heavy-load bags might be producible beyond the range of performance possible with cellulose-based papers; or writing paper for documents of legal or potentially historic importance. The principal technical problem seems to be bonding the synthetic fibres; however, a short list of bonding agents, both inorganic salts and synthetic adhesives, has been published already (*Chemical & Engineering News*, 1955, **33**, 956), a fairly clear indication that the problem is substantially solved.

Carried Forward

OUR note a month or so ago on germanium from ashes (see THE CHEMICAL AGE, 1955, **72**, 579) seems to require a postcript in view of a further communication, this time from the British Electric Authority's own research station, to *Nature* (1955, **175**, 558). Some sixty samples of dust and deposits from BEA steam-raising plant have been examined for germanium content, and the verdict is far from encouraging. With pulverised fuel burning, so much actual fuel ash is carried forward with the flue gases that there is little hope for fly-ash to become an enriched source of germanium. Sampling has confirmed this—even fairly static ash at a chimney-base contained only 0.01 per cent. Less fuel ash is carried forward in stoker-fired furnaces, and this would indicate that under those conditions fly-ash could be a considerably better source of germanium; sampling has shown a maximum content of only 0.015 per cent, however. In any case, the number of stoker-fired furnaces in large steam-raising centres, whether generating power or not, must be small now and will decline still more in the future.

Deposit Account

ALTHOUGH these results are so negative, there is some confirmation of the more hopeful view expressed earlier this year, that usefully enriched deposits may be found in such sites as economisers, superheaters, etc. Two samples of dust in superheaters showed a content of more than 0.1 per cent, one of them with 0.16 per cent; and 0.1 per cent is regarded as the minimum concentration for economic recovery. Much less promising, however, is the hard fact that such deposits are small in volume—one ton per year per boiler would be recoverable with difficulty! At 0.1 per cent, this merely means 2 pounds of the element per boiler per year. Worse still, germanium enrichment seems to be most inconsistent—many dust deposits will have to be sampled before just a few of them are shown to contain more than 0.1 per cent. More knowledge is required, as the new communication properly points out, about the relationship between germanium presence and coal composition or nature, and that between germanium release and combustion conditions. Then it might be possible to forecast with some reliability just where germanium-enriched deposits are likely to be found, in which boilers and in which parts of them.

Fertilisers, 1955

IN most years much of the spring's peak demand for fertilisers has been satisfied by now. The long winter has changed the fertiliser industry's opera-

tional calendar: with so much ploughing and planting not accomplished last autumn, it is an exceptionally active agricultural spring albeit such a late one. Another influence that has stimulated activity is the February farm prices review, which undoubtedly restored some of the confidence that smaller farmers had lost. It seems certain that the peak season of fertiliser demand will be lengthy this year, with some possibility of improved over-all tonnage. The industry's hope that farmers would take in their fertilisers early and so spread the distribution task over a longer period seems to meet with less and less response nowadays. Short-notice placing of orders has been a feature of the 1955 demand; although this often means delivery delay of anything between a week and three weeks, according to the type of fertiliser wanted, farmers seem to prefer taking this risk to making up their minds in advance and getting the bulk of their fertiliser needs into their barns. The task of the fertiliser industry is made far more arduous—even the best-equipped loading system has its limit for lorries or trucks per hour. By about the end of March, stocks of fertiliser in most works were cleared or down to minor residues and further deliveries depended upon current manufacture. With perhaps another five or six weeks of active and urgent demand to be met, this means a long period of overtime, and delivery delays may well lengthen. This is a regrettable aspect of otherwise welcome activity. The industry would like to give a better service but it cannot do so unless the peak demand period is staggered. Only the customer can bring this about; instead of this, each successive season brings an increased proportion of last-minute placing of orders.

Synthetic Potassium Nitrate

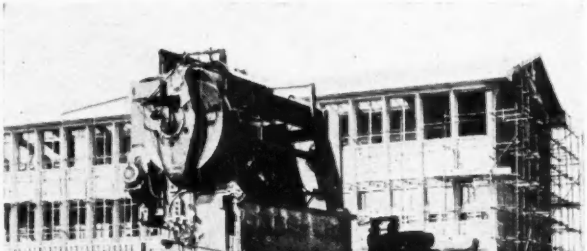
The Board of Trade give notice that they are considering an application for an increased protective duty on synthetic potassium nitrate. Any representations which interested parties may wish to make in regard to this application should be addressed, in writing, to the Board of Trade, Industries and Manufactures Division IA, Horse Guards Avenue, Whitehall, London S.W.1, not later than 30 April.

APV Coppersmiths Move In

THE centralising of The APV Co. Ltd. at Crawley, Sussex, entered its second stage during March when the coppersmiths occupied what is the largest coppersmiths' shop in this country. This shop consists of three 700 ft. bays adjoining the existing engineering shops.

APV are the largest employers of skilled coppersmiths in this country and virtually all their staff of craftsmen have been moved to Crawley New Town where houses have been provided for them.

The centralising process will be complete when the new office block, at present under construction, is occupied. This, it is hoped, will take place in the autumn.



A large brake press moves in to the APV Company's new premises at Crawley, Sussex. The office block under construction is in the background

The Chemical Society's Meeting

Sir Robert Robinson Honoured

THE anniversary meeting of The Chemical Society was held in London from 30 March to 1 April with a one-day symposium, a guest lecture, a number of works visits, the anniversary dinner, the annual general meeting, a luncheon given by the Shell Petroleum Co. Ltd., and finally, a reception given by the directors of Imperial Chemical Industries Ltd. The symposium took place on Wednesday and had as its subject 'Peptide Chemistry.' The lecture took place on Thursday. It was entitled 'The Outlook for Industrial Atomic Energy in Europe' and was presented by Dr. G. Randers of Sweden (see p. 849 this issue). On Friday, Professor W. Wardlaw, C.B.E., gave the presidential address, 'A Problem in Structural Chemistry.' The annual meeting took place on the same day as well as the Shell luncheon and the I.C.I. reception was held in the evening.

At the annual general meeting the following elections were declared: *honorary secretary*, Professor F. Bergel; *vice-presidents*: Professor M. Stacey and Sir Alexander Todd; *members of Council*: Dr. D. W. Adamson (London), Dr. G. R. Barker (Manchester), Professor F. Bell (Edinburgh), Dr. A. Hickling (Liverpool), Dr. A. W. Johnson (Cambridge), Dr. A. Maccoll (London), Dr. F. H. Pollard (Bristol), Dr. W. Wild (Harwell) and Dr. G. T. Young (Oxford).

The following retired from the Council: Professor E. L. Hirst and Sir John Simonsen (*vice-presidents*), Professor H. Burton (*honorary secretary*), and Professor D. H. R. Barton, Dr. N. Campbell, Dr. J. Chatt, Dr. S. J. Gregg, Dr. F. B. Kipping, Dr. E. A. Moelwyn-Hughes, Professor A. Robertson and Dr. M. A. T. Rogers (*elected ordinary members*).

Anniversary Dinner

The anniversary dinner took place on Thursday evening at the Fishmongers' Hall with the president, Professor Wardlaw, in the chair. The guest of honour was Sir Robert Robinson, O.M., F.R.S.

Proposing the toast 'The Chemical Society,' Dr. Alexander Fleck, F.R.S., chairman, Imperial Chemical Industries Ltd., said that the Society had been on the chemical scene for more than 110 years and he was sure that his audience would not need any appreciation from him.

As a young man he had been a contributor to the Society's publications and he would like to remind them that the Society taught young men a proper appreciation of the English language and how to put out their thoughts logically.

Chemistry in the Commonwealth

During the past year he had seen something of chemistry throughout the British Commonwealth and had been pleased to see that vigorous progress was being made. He had also been pleased to see active members of The Chemical Society in such places as Malaya and the Middle East. That was a good thing not only for the Society but for the world. A great deal was being said these days about productivity. In the US productivity was increasing at the rate of three per cent per year but The Chemical Society had been growing at the rate of between five to six per cent. This was a sign of health.

Professor Wardlaw said that Dr. Fleck had escaped the limelight for many years but had come into it when he became the chairman of one of the greatest industrial undertakings in the world. As chairman of the committee which had reported on the National Coal Board he had come further into the limelight.

They were tremendously indebted to Ambassador Conant for having come over from Germany to be present. In 1941 they had not been able to celebrate their centenary but had held a dinner with between 80 to 100 guests. Ambassador Conant had been one of those present on that occasion too.

They were gathered in honour of their principal guest, Sir Robert Robinson. They were not only paying tribute to him as a chemist but also demonstrating their very great affection for him. In a day or two the company would separate and depart for their homes in several countries. The meetings which they had had must have contributed something to chemistry as a science

but they had also increased goodwill among nations.

The toast to the guests was proposed by Dr. J. B. Conant, United States High Commissioner for Germany, president of Harvard University for over 20 years and an Honorary Fellow of the Society.

A great deal had happened in the chemical profession, said Dr. Conant, since he had started studying almost 50 years ago. When he first began teaching, opportunities had been few and as they looked over their rostrums in those days they wondered who was likely to die. World War II had done a great deal for the chemist. He had had the honour to mobilise chemists in the US to aid America's war effort and could recall the pleasant association between American and British chemists. In America they had entertained many eminent British chemists and he recalled a visit which Sir Robert had paid to the US in connection with RDX.

A Confession

Dr. Conant confessed that he had not read a line of Sir Robert's papers during the past 20 years but before then he had read every word. He had always obtained a great thrill from reading them and had often asked himself why he hadn't been bright enough to think of such things. Everyone present knew the brilliant work he had done.

It was not only as chemist that they admired him but as a man—a mountain climber, a lover of music and a man full of the zest of life. As an American and an ex-chemist, he saluted him not only as a scientist but for what he had done to foster good relations between their two countries.

Sir Robert Robinson said that The Chemical Society had acted as a kindly parent for many of those present. As Dr. Fleck had said it had corrected their grammar; sometimes it had even corrected their arithmetic.

He liked to look on Dr. Conant in his first stage as an organic chemist who was eminent enough to be an honorary member of The Chemical Society as well as of the Royal Institute of Chemistry and a Foreign Member of The Royal Society. As president of Harvard University he had introduced completely new ideas of education.

Mr. F. A. C. Guepin, a managing director of the Royal Dutch/Shell Group of Oil Companies, spoke on the serious shortage of scientists at the luncheon at the May Fair Hotel on Friday. A full report of Mr. Guepin's speech will be published in next week's issue.

Terylene Developments

ADDRESSING a meeting of the North-East Group of the Young Launderers movement in Leeds on 2 April, Mr. A. G. Myers, of the technical service department of the I.C.I. Terylene Council, forecast an early appearance on the market of Terylene cotton and viscose rayon fabrics, alongside the continued use of Terylene in conjunction with wool by the woollen and worsted industries.

Asked about 'customer protection' in connection with the laundering of these mixture fabrics, Mr. Myers agreed that garment fabrics in the manufacture of which Terylene was used should be so labelled. He mentioned that his firm, who at present were the sole makers of the filament yarn and staple fibres in this country, did provide such labels, but they could not compel manufacturers to use them.

Ethylene for Wilton

A NEW plant in the oil works for making ethylene from alcohol is described in the 31 March issue of *The Billingham Post*, I.C.I.'s Billingham Division works newspaper.

The equipment is the the first of its kind at Billingham and is on the acetone plant, where one of the three acetone reactors has been adapted and additional refining equipment installed. The ethylene is piped to Wilton where, by augmenting supplies from the olefine works cracker, it is making more ethylene available for polythene production.

Symposium at Manchester

A symposium on 'Organo-Metallic Compounds' is to be held in the Chemistry Lecture Theatre, Manchester University, from 10.30 a.m. to 6.30 p.m. on 21 April. It is under the auspices of the Chemical Society, the Institute of Petroleum, the Royal Institute of Chemistry and the Society of Chemical Industry.

Polymers from the Oxides of Carbon

by E. G. CURPHEY

BOTH carbon monoxide and dioxide can be used in the direct production of plastics materials. For instance, the polymeric ureas useful in the manufacture of fibres and resinous products may be obtained by the condensation of a polyamine with carbon dioxide at temperatures between 100 and 350° C, and at elevated pressures. Under such conditions of temperature and pressure carbon dioxide appears to behave like carbon disulphide, forming the analogous N-alkylcarbamic acid as intermediate. The bifunctional N-alkylcarbamic acids so formed readily undergo head-to-tail condensation to give the corresponding urea polycondensates:

$$—NH_2 + HO.CO.NH.R.NH_2 + HO.CO— \rightarrow NH.CO.NH.R.NH.CO—$$

Polymeric ureas have been prepared by reacting carbon dioxide with hexamethylene diamine for 22 hours at 200° C and 500 atmospheres(*1*).

In the presence of free radical generating catalysts, carbon dioxide has been copolymerised with ethylene, the conditions of the reaction requiring pressures higher than 100 atmospheres, the corresponding operating temperatures lying between 50 and 400° C(*2*). The chemical nature of the resulting polymer may depend upon the kinetics of the polymerisation, such as the reaction velocity of polymerisation of ethylene *per se* and that of the copolymerisation of ethylene with carbon dioxide. It is thought that the methane *bis*-vinyl ethers feature as important intermediates in this process:

$$CO_2 + [2CH_2:CH_2 \rightarrow CH_2(O.CH:CH_2)_2]$$

Reaction with the higher ethylene homologues would give products with bulky side chains, tending to reduce any secondary valency characteristics present. Such copolymers would tend to be more thermoplastic; 0.5 to 5 parts of ethylene have been used to one part of carbon dioxide.

Carbon monoxide has been used as a raw material for the synthesis of esters, polyamines and ethylene/carbon monoxide interpolymers. In the presence of cobalt catalysts, and at the higher temperatures, carbon monoxide reacts with alcohols and olefinic hydrocarbons to give carboxylic esters. In this way esters have been prepared from butadiene, isoprene, styrene, allyl ethers, etc., in conjunction with primary alcohols. The mechanism of reaction appears obscure, but cobalt carbonyl is thought to be the active intermediate through which the carbonyl is introduced in the polymer. Again based on the known reaction of carbon monoxide with methyl alcohol to give methyl formate, the production of methyl propionate from ethylene, methanol and carbon monoxide may be understood by assuming the initial formation of the formate, followed by alkylation by the olefine.

Metal Halides Replaced

The metal halides formerly used in the synthesis of acids, aldehydes and esters have been successfully replaced by cobalt carboxylates(*3*), the halides being undesirable owing to their corrosive properties. The yields of the resulting esters appear to vary with the complexity of the olefine used. The lower olefines such as ethylene and propylene will react satisfactorily at pressures ranging between 200 and 1,500 atmospheres, the more complex olefines requiring higher pressures.

Using peroxy catalysts such as benzoyl peroxide, peracetic acid, etc., carbon monoxide and ethylene copolymerise to wax-like products, which, although initially thermoplastic in nature, become thermosetting at the higher temperatures and are therefore useful in the preparation of moulded products. Below are shown the melting points and viscosities of some ethylene/carbon monoxide copolymers. The viscosities (with the exception of the first polymer) are compared with 0.125 g. of *m*-cresol in 100 ml. xylene; for the first polymer water is used as solvent.

Ethylene/CO Ratio	mp (°C)	η
1.8	96-98	0.33
2.2	87-88	0.43
2.9	90-92	0.33
4.4	90-95	0.24

Versatile products with applications as peptising agents for rubber, deflocculating agents for water repellent waxes, and leather additives to improve the dyeing properties, have been obtained by the copolymerisation of carbon monoxide with ethylene. Of particular use in this respect are the poly-

amines obtained from ethylene/carbon monoxide copolymers after amination and reduction (4). The reaction possibly involves an initial amination process of the carbonyls in the chain, giving an hydroxy-amino intermediate, which on reduction with hydrogen (using active nickel catalyst) gives the corresponding polyamine.

These polyamines are usually prepared in a silver-lined reaction vessel, containing polymer and catalyst in dioxane as solvent, anhydrous ammonia being introduced after the vessel has been evacuated. The contents are agitated and connected with hydrogen under pressure for 5 hr. at 120° C and initial pressure of 166.7 atmos. The polyamines dissolve in dilute solutions of acetic acid to give colourless solutions.

Fabric Printing

Successful strike-outs on cotton broadcloth have been effected using suspensions of copper phthalocyanine pigment (200 parts) in a solution of polymeric polyamine (100 parts) in 5 per cent aqueous acetic acid (10 parts). After drying for 24 hours, the pigment was firmly bound on the cloth. Coatings containing titanium dioxide and 37 per cent formaldehyde dry to good finishes after 15 hours, the pigment remaining firm to scrubbing.

Useful modified interpolymers of carbon monoxide/ethylene interpolymers, both solvent and heat resistant, are obtained by treating the copolymer with basic compounds like the primary, secondary and tertiary amines, quinolines, hydrazines and quaternary ammonium salts, 1 to 25 per cent by weight of interpolymer being used. Such modified products have been prepared by taking 10 parts of polymer (3.1:1) and adding dioxane (250 parts) and 87 per cent hydrazine (4 parts) and refluxing the mixture for four hours, the solvent being removed by steam distillation.

Adhesives, and other products suitable for mouldings, have been obtained by treating a dioxane-methanolic solution of CO/ethylene interpolymer with alkali (5), giving an unsaturated intermediate, a friable product soluble in dioxane and chloroform. Such substances are rendered thermosetting by mechanically mixing with a formaldehyde releasing substance (usually 2 per cent by weight of polymer), the mixture being heated on a metal melting point block at 170° C. Compositions made from such compounds may be used in the preparation of shaped articles by compression moulding or in applications involving jet or transfer moulding techniques. The resulting products find many uses as bonding agents for plywood and as decorative coatings for metal and wood. They are also useful as impregnants for hardening woods and as bonding agents for abrasives.

The formaldehyde probably reacts at the α methylenes to form hydroxy-methyl derivatives, which through loss of water between the hydroxyl and α methylenes in adjacent chains form cross links. Bars moulded from a mixture containing interpolymer 21 parts (30 per cent CO), water ground mica 27 parts, paraformaldehyde 5.5 parts, maleic acid 1 part and aluminium stearate 0.8 parts have a flexual strength of 6,070 psi., and a tensile strength of 3,000 psi.

Hydrocarbons have been prepared by the reduction of CO with hydrogen at 300° to 400° C, nickel chromite being used as catalyst (6). In the initial stage the oxide may exist as a cyclic polymer, hydrogenolysis and reduction of which would give the higher hydrocarbons.

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(1) BP 619276.
(2) BP 620963.
(3) BP 651853.
(4) BP 652566.
(5) BP 593910.
(6) BP 613180.

QVF Exhibits At Achema

AMONG apparatus which will be shown at the Achema exhibition at Frankfurt this year (from 14 to 22 May) is an 18 in. diameter tower by QVF Limited, producers of glass pipeline and glass chemical plant, of Stone (Staffs). This is described as a typical example of the world's largest flanged glass tower.

It is being shown as a general example of tower construction and can be used as a fractionating tower, wash tower or absorption column. An armour-plate glass tank of 220 litres capacity will be shown in connection with the tower and from this a Tungstone all-glass pump will be in operation. Air operated, the pump has a capacity of 1,400 l. per hour against 30 ft. of water.

Also on the QVF stand will be a plant scale unit of a steam-jacketed climbing film evaporator constructed entirely in heat and chemical resisting borosilicate glass. A 10-plate bubble plate column with two vapour and liquid sampler plates is also to be shown.

A Simple Shielded Micro-Burner

by J. T. STOCK, M.Sc., Ph.D., F.R.I.C., & M. A. FILL, F.R.I.C.
(Norwood Technical College, London, S.E.27)

IN micro-chemical heating operations the flame, often only 10 to 15 mm. high, is rarely applied directly to the apparatus; rather the gases rising from the micro-flame provide the actual heating. The effect of draughts is very marked and, under ordinary laboratory conditions, some form of shielding is often necessary. A simple damper-control shield has already been developed (*1*), but, where the fine control provided by this device is not needed, the simple shielded micro-burner shown in Fig. 1 is quite satisfactory.

The device consists of an ordinary Bunsen burner on which the flame tube has been replaced by a 250 g. screw-capped reagent bottle with the bottom removed. The flame, and the contents of any vessel placed within the shield, are clearly visible at all times. The bottle is secured by means of its cap, as shown; the cap may be of plastic material, but a metal one is preferable.

A hole sufficiently large to accommodate the screw thread below the burner jet is drilled in the centre of the cap and this hole is surrounded by eight 3/16 in. diameter ones for the admission of air as shown in plan view at (a). The drilled cap is secured to the burner by means of a nut, as shown in section at (b). To avoid machining operations, this nut may be made from sheet lead, from 1/16 in. to 3/32 in. thick. A one-inch square of such sheet may be cut with scissors, when a central hole about the the root diameter of the burner screw thread may be reamed out by means of a pocket knife or tapered file. Having greased the screw thread, the lead blank is then gently forced to screw on; the brass screw thread is not damaged by having to cut its way through the soft lead. Having formed the thread, the lead nut is trimmed down to small size, so that it does not cover the air-holes in the cap when the latter is in place.

The simplest and most rapid method of removing the bottom portion of the bottle is by use of a 1/16 in. thick elastic bonded abrasive wheel. The operation then takes only about a minute and leaves a beautifully smooth cut. When such equipment is not available, the operation may be carried out by means of a glass-cutter. Although a diamond is preferable, an ordinary wheel-type cutter gives quite good results. The cutter is mounted at the appropriate height in a bosshead on a retort stand. Two flask clamps are then similarly mounted below the cutter, so that their stems form a V-guide in which the bottle may be rotated.

Pressing it firmly into the V-guide and against the cutter, the bottle is steadily rotated to give a clean scratch right round. If the scratch is satisfactory, a clean break will occur when the bottle is tapped. Prob-

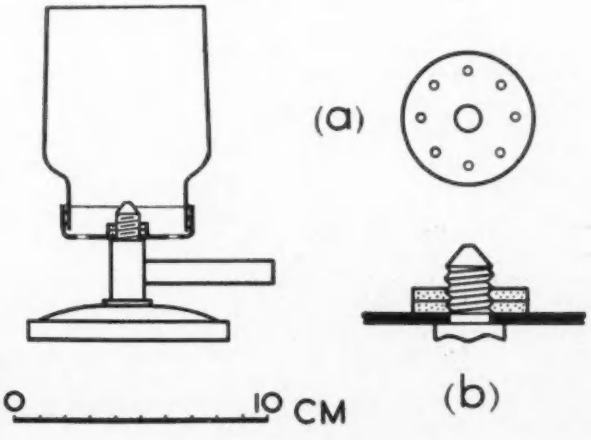


Fig. 1.—Simple shielded micro-burner (a) plan of cap; (b) method of retaining cap

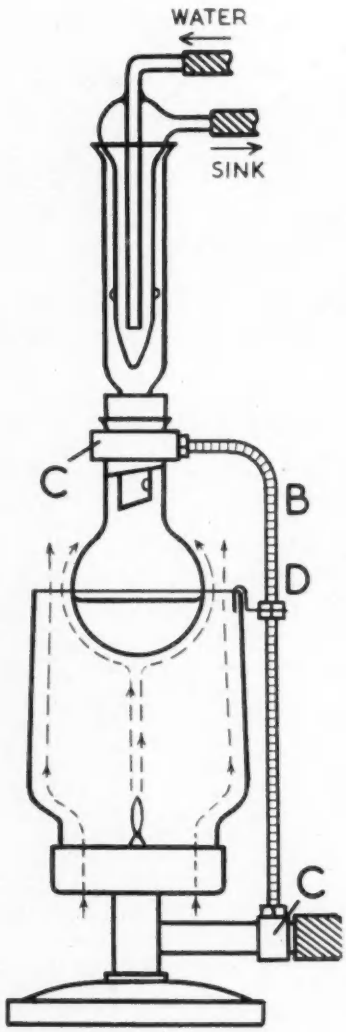


Fig. 2.—Snap-on supporting arm for micro reaction-assemblies

ably the best way to do this is to lightly tap the inside of the bottle along the scratch. Any slight irregularities may be removed by rubbing the bottomless bottle on a carborundum stone, or on a sheet of copper which has been 'armed' with medium-grade carborundum paste. The cut-off portion of the bottle makes a useful dish for filter-paper-discs, ignition tubes, etc., or, if the cut is ground flat, the addition of a gas-jar cover makes a useful micro-desiccator.

Using a very small flame, the microburner is ideal for the evaporation of liquid drops on a microscope slide, which is merely laid diametrically across the top of the shield. The projecting ends of the slide remain cool, so that handling is easy.

Various attachments may be made to fit on the glass shield. For example, a right-angled supporting arm B, of No. 4 BA screw rod, carrying Terry clips C.C, at the ends, may be used to support a micro-reaction-assembly as shown in Fig. 2. Ample rigidity is provided by wire stay D. This is secured between two units on the supporting arm and grips the rim of the shield. The flask of the reaction-assembly must not

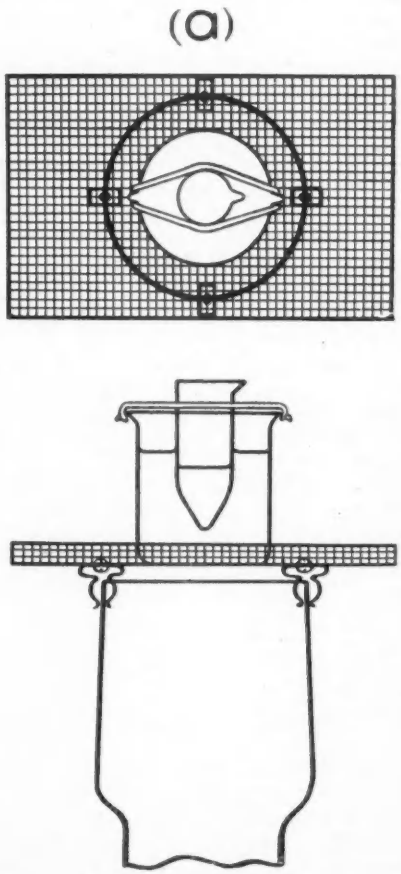


Fig. 3.—Clip-on tray for micro water bath; (a) plan view showing position of clips; (b) crystallising tube support in bath

be too large; while the rising hot gases supply heat where it is needed, part of the cool air drawn in through the ample air-holes flows up the walls of the shield, as shown in broken lines. Using a 20 ml. micro-flask, the shield should remain cool enough to be held in the hand, even when, say, decalin (bp. 198° C) is being refluxed.

Another convenient accessory is the tray shown in Fig. 3. Bent up from ordinary 3 mm. mesh wire gauze, the tray carries on its underside four small-size Terry clips. These not only locate the tray on the shield, as shown in plan view (a), but also raise the tray about 5 mm. from the top of the shield. This clearance is essential; if omitted, the shields gets very hot and may crack. This clip-on tray may be used for warming crystallising tubes and other small apparatus, or for supporting a squat 75 ml. beaker, to serve as a micro-hot water bath. A micro-test tube, crystallising tube, etc., may be supported in this bath by slipping the tube within a rubber band stretched between two glass 'ears' fixed to the rim of the beaker, as shown in plan view (2). The temperature of the bath may be reduced by pushing it toward the corner of the tray.

By removing the base of the burner and soldering on to the gas inlet tube a 4 in. length of brass tubing, the burner may be conveniently mounted in a bosshead on a retort stand. This modification is often preferable to raising the burner by standing it upon blocks and is of course much more rigid. The length of the tubing (which may be an old corkborer, although this is rather thin) should fit snugly over the gas inlet tube, so that the soldered joint may be a strong one.

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Working Model of Atomic Pile

The United Kingdom Atomic Energy Authority has lent to the Science Museum a large working model showing the BEPO atomic pile, the larger of the two pioneer atomic piles set up at Harwell. This pile went into operation in July, 1948 and is used for research purposes and for 'cooking' the radioactive isotopes which are now so widely used in medical research and treatment, in agricultural research and in industry. The model is on view in a recently opened ground floor gallery of the museum.

Russians for Peace

Chemical Society Hear Dr. Randers

GENEVA conference in August on the peaceful uses of atomic energy will have a large Russian contingent, perhaps 50 to 100 scientists, if the impressions of a leading Norwegian nuclear scientist become fact. The Norwegian, Dr. G. Randers, director of the General Establishment for Nuclear Energy Research at Kjeller, Norway, mentioned this when he spoke at the annual meeting of the Chemical Society in London on 31 March.

Dr. Randers had been back in the west, from a Moscow visit connected with the conference, only a few days. He did point out, however, that there had been no official pronouncement by the Russians about their delegation. He had gained the impressions from talks with other scientists in Russia. He said: 'From what we could judge from discussions in Moscow they are going wholeheartedly for the conference.'

Of the Eisenhower plan for the pooling of nuclear information for peaceful uses Dr. Randers said: 'It is not moving very fast. There has been no news published about it for much too long a time, which indicates that things are not moving smoothly. No-one expected they would.' But at the August conference, Russians and Americans would be sitting down together at the conference table and the mere fact that it had already been possible to open discussions with the Russians showed the new approach had achieved 'one little step.' No-one should be pessimistic about the smallness of the step.

Dr. Randers gave a clue as to the direction Norwegian research would take. He said both the United Kingdom and Norway were interested, as maritime powers, in atomic propulsion for shipping. 'In Norway we hope at least to have a finger in the construction of ship reactors,' he declared. Only certain types of ships would have atomic energy propulsion in the next twenty years. These would be ships in constant use over long distances or at high speeds because of the high cost of investment in the reactor. He believed large tankers were a suitable type. 'From rough calculations we find it impossible to rule out that even with the rather primitive reactors at present, a big tanker could be run as cheaply on atomic energy as on conventional fuels.'

New I.Chem.E. Examination

First Part to be Held This Year

ATTENTION was focused at the recent OEEC conference on chemical engineering in Europe on the revised examination of the Institution of Chemical Engineers. A paper was devoted to it during the fourth session, and one speaker said the syllabus for the examination provided a model course such as had been discussed in the previous session.

The examination was revised in 1953 with three main objects: to examine in the principles of chemistry and physics before admission to the examination in chemical engineering; to increase the number of papers so that the subject matter can be covered more adequately; and to provide a ladder for candidates to qualify as students, graduates and associate members of the Institution.

In Three Parts

The revised examination which comes into force next year is in three parts, and the papers are as follows:

Part 1—Physical chemistry and principles of thermodynamics; inorganic and organic chemistry; strength of materials, machine and structural design; engineering drawing.

Part 2—Combustion processes, heat transfer and heat engines; flow of fluids and theory of mass transfer; process plant; plant construction and works practice.

Part 3—Home Paper, a problem in chemical engineering plant design.

Examination requirements for the several grades of membership are: student, Part 1; graduate, Part 1 and 2; associate member, Parts 1, 2 and 3; member, no further academic requirement beyond that for associate member.

Part 1 only is to be held in September this year. Parts 1, 2 and 3 will all be held next year.

Exemptions are granted in some or all parts of the examination to candidates with the appropriate qualifications. A first degree or Higher National Certificate in chemistry, or associate membership of the Royal Institute of Chemistry exempts from the first two papers in Part 1. A first degree or Higher National Certificate in civil, mechanical or electrical engineering or graduate or associate membership of the Institutions of Civil, Mechanical or Electrical Engineers exempts from the second two papers in Part 1. A first degree or diploma in chemical engineering from approved universities or technical colleges, or Higher National Certificate with endorsement in chemical engineering exempts from Parts 1 and 2, and a first or second class honours degree or higher degree or postgraduate diploma of certain universities and colleges exempts from the whole of the examination.

No attempt is made to exclude any candidate who wishes to sit for the examination, even if he has had no regular tution at all.

The Home Paper is a particularly interesting feature of the examination. It is a problem in chemical engineering plant design which the candidate tackles in his own time over two months. He must sign a declaration before a witness that he has done all the work himself without any help, except in typing. A satisfactory answer must be worked out from first principles, using information published in textbooks and periodicals which are readily accessible. No credit is given where a candidate has specialised knowledge of the process and uses data not available to others.

Essential Requirements

The candidate is expected to show that he is able to study published information, that he can select the most suitable method of operation in terms of the conditions laid down in the question and can calculate from first principles the leading dimensions of each major unit of chemical process plant, so that detailed working drawings of the units could be made from the information he provides, or the units could be ordered from manufacturers of specialised equipment. He is then expected to assemble the units into a complete plant by means of a general arrangement drawing which shows the siting and interconnection of the units. A detailed drawing of a major vessel is also required of sufficient accuracy to form a basis for workshop construction.

The examination rules and syllabus are published in a handbook.

Domestic Water Treatment

Improved Chemical Methods Developed at Staines

RAPID progress is being made in the new chemical treatment of water at the upward flow sedimentation plant at the South West Suburban Water Company, Staines. This is the result of four years' experimental work on a pilot plant that has brought agreement on a combination of reagents suitable for the successful coagulation and sedimentation of Thames water.

The standard dosage is 30 ppm. of aluminium sulphate and 2 ppm. of modified sodium silicate. In order to render the sodium silicate effective as an aid to coagulation it must be modified, and in the early stages this was carried out by the use of hydrochloric acid. However, it was later found possible to effect satisfactory modification by the use of sodium bicarbonate, thus dispensing with the need for concentrated acid.

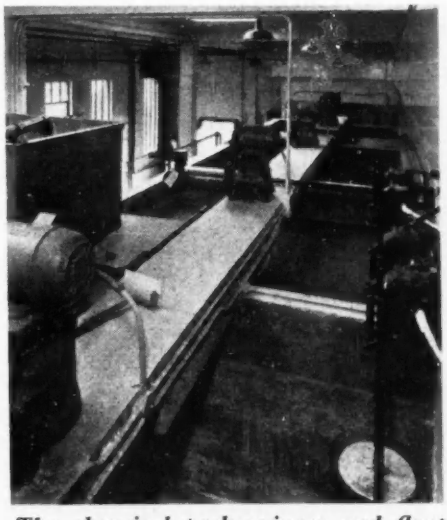
Before Installation

Before the installation of the plant, treatment of the Thames water consisted of primary filtration through two batteries of rapid gravity filters, secondary filtration through slow sand beds, and sterilisation by break point chlorination, followed by the removal of excess chlorine with sulphur dioxide. During flood conditions, this treatment resulted in water bearing a relatively high content of suspended matter being passed directly on to the primary filters, followed by rapid sealing of these filters, with the consequent necessity of frequent cleaning. In fact, during bad floods the running period of the filters fell as low as 50 minutes.

The full scale sedimentation plant consists of 20 Candy vertical flow sludge blanket tanks square in plan with hopper bottoms. Incoming water is introduced at the bottom of the hopper where the velocity causes flocculation of the coagulated suspended matter. As the water rises to decanting channels at the surface, the velocity falls to a minimum in the vertical sided portion. This reduced velocity allows the flocculated matter to be retained in the settling tank where it forms a suspended 'blanket' through which all the water must pass. This acts as a form of filter, completing the initial flocculation produced in the bottom of the hopper. Periodically, some of the sludge is removed to prevent the blanket level rising too high in the tanks. As the sludge is maintained in a fluid condition in the hopper by the velocity of the incoming water, its removal is effected by a simple arrangement of sludge piping and valves.

The modified sodium silicate and sulphate of alumina are introduced into the supply main just before the water enters the flash mixer, the alumina generally being injected seven seconds after the silicate.

The plant for the preparation of modified sodium silicate consists of a pair of concrete solution tanks fitted with motor-driven paddles. The concentrated sodium silicate stored in a horizontal cylindrical tank is delivered to a measuring tank by a motor-driven pump and then flows by gravity into the solution tank below, where it is diluted. The bicarbonate, stored in bags, is lifted by means of a mechanical stacker and then tipped into the solution tank. The ageing process necessary for preparing a modified sodium silicate is auto-



The chemical tank mixers and float switches for the sodium silicate tanks

matically sequenced by a process timer, the final mixing and dilution taking place without any manual control.

Solutions of modified sodium silicate and sulphate of alumina are injected to the point of application by metering pumps. As the flow of water to the plant varies from time to time, the pumps are driven from a shaft which rotates at a speed proportional to the flow of water. This proportional speed control is automatic and works in conjunction with a venturi tube in the water main through a Candy centrifugal balancer controller.

A feature of this method of treatment is that as the condition of the river water deteriorates, the treatment becomes more effective, and the resultant water passed to the primary filters is so improved in quality that the period between washing the beds has been extended to 50 hours for the worst conditions of flood.

Information Should be Shared

BPC Recommendations for Pharmaceutical Industry

THE growth of the British pharmaceutical industry since before the war is stressed in a report published by the British Productivity Council.* The report, briefly reviewed last week (p. 800) emphasises the importance of the pooling of ideas between individual firms. 'Although some progress has been made in recent years in breaking down the barriers existing even between non-competing firms, much more has still to be achieved,' it says. 'There are few companies which could not contribute to a common fund of information on new methods.'

In the past 20 years the industry has increased its output threefold in volume and nearly sevenfold in annual value—from £19,000,000 in 1935 to an estimated £130,000,000 in 1954. This rise is partly explained by the general rise in prices and partly by the advent of costly new drugs stimulated by the war. Exports, too, have risen by more than 1,000 per cent, and the labour force involved has increased from 22,000 to 53,000. Nearly one-third of current production is absorbed by the NHS.

One of the most striking features of the pharmaceutical industry is the variety of practice between one firm and another, necessitated in part by the immense range of the industry's products. This to some extent limits the benefits to be obtained from pooling of technical information, exchange of team visits, etc., but, the report observes, 'it is probable that a higher degree of collaboration than at present exists would be of value, particularly to smaller concerns.'

One of the biggest steps towards more efficient production was taken when the Association of British Pharmaceutical Industry's Productivity Committee recommended in 1952 that liquid galenicals should be sold by volume instead of by weight, and that solids, liquid galenicals and pharmaceutical chemicals should be sold by metric weights and measures. This came as a result of the visit by a Productivity Team to the US, and most firms adopted the recommendation. Because of difficulty in working it, some have since rescinded their decision, but the report says that the difficulties 'may be expected to diminish with the passage of time.'

The Productivity Team stressed in its recommendations the advantages of specialisation and urged that firms should reduce their range of products wherever possible. In many firms there is a reluctance to do this, for fear of losing established customers, but nevertheless an increasing trend towards specialisation is apparent.

The report stresses the importance of production planning, work study, standard costing and other industrial techniques. Since the report of the Productivity Team was published, it says, much new and improved processing machinery has been developed in this country, and it is probable that British pharmaceutical firms now have available equivalents (at least) of almost all the items of American equipment mentioned.

The pharmaceutical industry is remarkable for the excellence of its labour relations, and the fact that no dispute serious enough to cause a stoppage of work has ever occurred is evidence of the care taken by managements to foster good relationships.

* *The Machines Behind Medicines: A Review of Productivity in the Pharmaceutical Industry*. British Productivity Council, 21 Tothill Street, London, S.W.1, 2s. 3d.

Russian Petroleum 1954-55

FROM A CORRESPONDENT

SOVIET official or ministerial reports are often a strange mixture of highly successful achievement and disastrous deficiencies. Not so long ago a ministerial report was issued on the glass and ceramics industry. It began with a glowing account of the great work already done, with even greater to follow; and then came the oft repeated dreary list of *nedostatki*—inefficiency and insufficiency. Much the same, only more so, applies to the report of the Soviet Minister of the USSR Petroleum Industry, N. K. Baibakov, just published in the January 1955 issue of the journal 'Petroleum Economy' (*Neftyan. Khoz.*). This comprises three pages of trumpet-blowing and nine pages of mournful denunciation of slackness, negligence, and general deficiency. Even the Azerbaijan Republic, one of the principal Russian oil regions, comes in for prolonged and severe censure. It is a little difficult to reconcile the first and second parts of the report, or to fathom the policy, if any, behind this pillory of criticism. Possibly it is intended to stimulate (or goad) to better efforts.

Comparison of Figures

No absolute production or other figures are given, only the usual percentage or multiple increases. But some basic figures, up to 1952 or thereabouts, are presented in some detail in Hassmann's 'Oil in the Soviet Union,' of which an English edition was published in the USA in 1953; this could probably prove useful in conjunction with the latest percentages or other comparisons given in this official report. For example, it is claimed that the Soviet Union obtained about 100,000 tons of oil, gas, and products, above the over-all Plan; also the rate of production was higher than in 1953, especially in the eastern regions that now account for more than 60 per cent of the grand total. Some important oil discoveries are said to have been made in these parts, notably in the Tartar and Bashkir republics; also in the Uralo-Volga region generally.

New discoveries are also mentioned in other parts, further east and north in Siberia, but no details are given. More attention is apparently given to improved methods, e.g. of secondary recovery, increased water pressures and injections—including hot water and what is known as hydraulic fracture of oil-bearing formations. This latter is said to have been very successful in low-oil strata and in restoring apparently dry wells to periodic activity. Some examples of this are given for Azerbaijan, Grosny, etc.; and in Tartary and adjoining territory some 20 or more such wells were restored. The amount of pressure water used is stated to have been 34.7 per cent more in 1954 than in 1953. Turbine drilling too is now much more widely adopted than hitherto, and drilling rates greatly accelerated. It is thought that this may be still further improved by use of new types of drilling fluids or muds. A brief account of one of these is given in an addendum to this article.

Crude Oil Processing

Crude oil processing occupies an important place in the report. New plant on a large scale is being erected and existing plants modernised and mechanised. Several cases are cited of large excesses of oil products over the planned targets, e.g. at the Krasnokamsk oil works, and in several of those in the Baku and Batoum districts. This probably refers more to the New (or Second) Baku than to the old one. Attempts are being made to collect more of the enormous quantities of gas which still escape to atmosphere, but progress appears to be slow, despite the admittedly vast importance of gas and its products to the Soviet economy.

Turning to the other side of the picture, Baibakof deplores the slackness in nearly all the oil centres in some department or other. Although the Soviet government, he says, has devoted huge capital resources to the oil industry, these have not been adequately or properly utilised. In Azerbaijan the planned drilling programmes for 1953 and 1954 have not been fulfilled, although it had been admitted earlier that the scheduled amount of oil had been supplied. The lost time and accident rate is still high due to careless inattention to rules that should be much more strictly enforced.

The latest methods have not been introduced so widely and quickly as they should have been. In many present and potential oil districts, including those of Siberia, ex-

ploration work has been slow and inefficient. Several examples are given of inadequate use of water pressure and hydraulic fracture methods. Many of the oil factories have come short in production of light oils and other products. The Orsk oil-works for 1954 has failed by several thousand tons. In another case in the Kuibyshev region the shortage is about 10,000 tons. Inefficient methods have been applied to treatment of the sulphur oils of the east. Much more research must be devoted to this particular problem.

Numerous Deficiencies

In building construction and general equipment there are numerous deficiencies. Insufficient use is made of the most modern constructional methods, of concrete, ferro-concrete and large building units, and of effective mechanisation. More research centres are needed for seismic and other work, core-taking and sampling, new drilling fluids and methods, better control and instrumentation—including more automatism. A special body, the Glavneftesbyt, will be charged with the responsibility of much of this new development.

The building programme for 1955 includes new oil refineries, research stations, pipe-line, and new oil equipment factories. Special mention is made of drilling bits in which direction the VNII-Bur-Neft (Research Inst. for Oil-drilling Tools) has been negligent in developing the best up-to-date type of tools. Other research and allied institutes are those of Azerbaijan, Grosny, etc., for which new and better work for 1955 is strongly urged. Other targets for 1955 include a reduction in cost of oil products by at least 4 per cent. and in estimated building costs by about the same percentage. The minimum rise in labour efficiency must be at least 5 per cent.

New oil-well drilling fluid. In the same issue of the Russian oil journal, S. N. Yatrov suggests the best use of water with certain surface-active agents added as stabilisers, mainly it seems for drilling through limestones in which particles of the drilled rock form a dispersion system with the water. This idea has been tested in the Vereia and Upper Bashkir formations of the Middle Carbonaceous of the Saratov region, and neighbouring districts. He discusses at some length principles of sedimentation, colloidal disperse systems, and effect of stabilisers, in connection with some preliminary laboratory experiments, with effect on specific gravity, viscosity, water separation, etc.

The materials used as stabilisers included sodium silicate, sodium humates (known as UShChR), caustic soda, and a material designated as SSB (not defined but apparently no better than the humates). In some of the actual field tests large quantities of lignite were used. Results of drilling tests with limestone dispersions in two bores are recorded, one with and one without the new fluid. Water was mainly used for about the first 1,000 m., and for the next 500 m. or so the new stabiliser was introduced. A marked increase in drilling rates is claimed, varying for the different formations (four in all) from 145 to 320 per cent. The use of clay, with its inconvenience, transport costs, etc., is practically eliminated. Most of the strata traversed were hard limestones and dolomites with some pyritic conversions.

Epikote Resins In Tanker

LATEST addition to the coastal tanker fleet of Shell-Mex and BP Ltd., the *Shell Welder* contains three different forms of anti-corrosive measures in the cargo tanks. Two tanks are coated with Epikote based paint, two have cathodic protection and two have a metal sprayed coating. The tanks which are protected cathodically are those which are normally used for water ballasting purposes. Cathodic protection could not be used for non-ballast tanks.

Although a certain amount of experience of Epikote based paints has been gained from ocean-going ships of the Shell fleet and ships of other companies, the *Shell Welder* is the first tanker in this country to have complete cargo spaces protected in this way. It is also believed that she is the first short haul coastal type of tanker to use the cathodic protection system.

The company state that as a result of these experiments it is hoped to obtain some valuable information on the technical and economic merits of Epikote finishes and metal spraying in conjunction with cathodic protection. Epikote resins, marketed in this country by Shell Chemicals Ltd., give a coating that can be cured at temperatures between 15° and 60° C, but possessing the hardness, flexibility and resistance to water, solvents and chemicals normally only obtained with high temperature stoved coatings.

Shawinigan

Business Improved Late in 1954

PRESIDENT of the Shawinigan Water & Power Company, in the annual report of the parent company for 1954, states that the general outlook for chemical business in 1955 both in Canada and the United States, and in overseas markets, would indicate a somewhat better level than in 1954.

Manufacturing operations of Shawinigan Chemicals Ltd. in 1954 reflected the lower level of general business activity during the first five months. There was, however, a marked improvement during the last quarter both in domestic and export markets. The company has sales connections in many parts of the world and in 1954 its products were shipped to 49 different countries. It is therefore in a good position to profit from any general increase in world trade and easing of controls.

Operations of the associated company, Canadian Resins & Chemicals Ltd., which were similarly affected by general business conditions during the first three quarters of the year, showed much improvement in results during the last quarter. The petrochemical plant of B.A. Shawinigan Ltd., another associated company, which was put in operation in 1953, operated satisfactorily. The plant of St. Maurice Chemicals Ltd. at Varennes, Que., which started production of pentaerythritol and formaldehyde in 1953, operated successfully throughout the year.

Sales of Shawinigan Chemicals Ltd. were 7.4 per cent lower than in 1953, owing to the general business recession which was experienced during the early part of the year and the intensified competition in all markets. Earnings from manufacturing operations were somewhat lower in consequence, and totalled $1,118,154 as against $1,361,370 in 1953.

Improvement in UK

Business of Shawinigan Ltd., London, wholly-owned subsidiary, was considerably better than in 1953, largely as a result of intensive sales efforts throughout the year and also due to more liberal import regulations into the United Kingdom. Sales of Shawinigan Chemicals products increased markedly, and the volume of business in products of other chemical manufacturers was also larger. Net profit for the year (subject to audit) totalled £30,720 as against £16,372 in 1953. Dividends for the year received by Shawinigan Chemicals from Shawinigan Ltd. totalled $54,087, when converted at rate of exchange prevailing when payments were received.

US Subsidiaries

Sales of Shawinigan Products Corp., New York City, wholly-owned subsidiary, continued at about the same level as in the previous year. Its subsidiary and associated companies include Shawinigan Resins Corp., Springfield, Mass., Midwest Carbide Corp., Keokuk, Iowa, and Gelvatex Coatings Corp., Aanaheim, Cal. Shawinigan Resins Corp. enjoyed an excellent year, and its sales and earnings were the highest in its history. In view of considerable capital expenditure, the dividend was maintained at the same rate, a total of $157,250 US funds being received from this source by Shawinigan Products Corp. This compares with $143,000 received in 1953, the increase being due to subscription for additional shares.

Gelvatex Coatings Corp., which is almost wholly owned by Shawinigan Products Corp., completed construction of a new manufacturing plant at Aanaheim, Cal., which came into successful operation in May, to produce special vinyl-base paints. There has been an increasing demand for its products.

Total net earnings of Shawinigan Products Corp. for the year from all sources amounted to $389,803, as against $419,100 in 1953. Dividends paid by it to Shawinigan Chemicals Ltd. totalled $344,000, the same as in 1953.

Earnings of Canadian Resins & Chemicals Ltd. for the first nine months of the year were somewhat lower but improved during the last quarter, with the result that net earnings for the year were 8.3 per cent higher than in 1953. Dividends from this company, included in the income of Shawinigan Chemicals Ltd. for the year, totalled $155,232, unchanged from 1953. Income received from royalties on patents totalled $352,110, compared with $309,794 in 1953.

Total earnings of Shawinigan Chemicals

Ltd. from all sources amounted to $1,842,909 as against $2,043,423 in 1953. Dividends totalling $1,125,100 or $4 per share, the same as in 1953, were paid to the parent company, Shawinigan Water & Power, leaving a balance of $717,890 which was retained in the business for future needs.

Canadian Resins & Chemicals Ltd.'s new printing and embossing plant at Ste. Therese, Quebec, went into production in July and is operating satisfactory.

The president, Mr. J. A. Fuller, commenting on 1954 operations says 'the record of 1954 would be incomplete without reference to our research work on titanium. As announced early in 1954, the company's research department succeeded in producing a high grade of titanium metal experimentally on a small scale. Patents have been obtained in several countries, and the development work has been expanded to the scale of a larger pilot plant which is now in operation, and from which, it is hoped, more conclusive results will be obtained in 1955.'

World Cobalt Output Up

PRODUCTION of cobalt in the 'free world' reached a record figure of 14,500 short tons in 1954, according to the US Bureau of Mines. This is 7 per cent more than the 1953 figure; it is the fifth successive increase.

The International Nickel Co. of Canada Ltd. began commercial production of electrolytic cobalt at its Port Colborne (Canada) refinery in October. As a result of improved efficiency and greater continuity of operation at its new refinery at Nkana, Northern Rhodesia, Rhokana Corp. produced 2.7 times more cobalt metal than in 1953. The refinery of Union Minière du Haut-Katanga, Belgian Congo, operated at near capacity in 1954.

On the other hand, production of cobalt metal in the USA, which had increased for five consecutive years, decreased by 0.5 per cent in 1954. Imports into the country were also down, by 2 per cent.

Canadian Millstone

Du Pont President Urges Devaluation

CANADA's premium dollar, though it may be a source of national pride, is just a millstone around the neck of Canadian industry, according to Mr. Herbert H. Lank, president of Du Pont Co. of Canada. It is up to the Government to recognise the plight of Canadian industry and allow the dollar to drop to par with US funds, or perhaps even fall to a slight discount, he felt.

'Our premium dollar attracts imports from around the world, particularly in those lines where Canadian industry has inedequate protection in the way of tariffs,' said Mr. Lank. 'It is no easy task to build up manufacturing in this country when we have to fight for a share of the limited Canadian market and can't get our goods over the tariff walls of other nations.' The higher-priced dollar also means wage rates are higher than those of foreign competitors, even if they are the same numerically in dollars and cents, he pointed out. Canadian workers who get comparable wages with US workers are getting perhaps four or five cents an hour more in terms of the premium dollar.

It even costs more to build plants in Canada. As against comparatively cheap construction in many parts of the US, plants must be built to withstand heavy snow loads. Production runs must be small because the market is small, and without protection it is difficult to compete with an industrial giant like the United States which has added twice the population of Canada to its home market in the past 12 years. 'Unless you are using Canadian natural resources it is hardly economic to manufacture here,' Mr. Lank suggested.

Commenting on the segregation of Canadian Industries Ltd. last year and the formation of two companies, Mr. Lank reported that these two new organisations are in direct competition in some lines. He cited the new explosives plant to be built by Du Pont of Canada near North Bay as an example. CIL for years enjoyed supremacy in the manufacture of explosives in Canada, and that division of the company was turned over to the new C-I-L 1954 company when the firm split. 'It's not the first time we've been in competition with C-I-L—and it won't be the last,' said Mr. Lank. 'We feel there is a growing market for explosives in Canada, particularly in the north, and we're going after a share of it.'

He pointed out that C-I-L 1954 has opened a synthetic fibres plant near the Du Pont nylon plant at Maitland, and there is bound to be some competition between the products of these two plants.



METHODS OF QUANTITATIVE MICRO-ANALYSIS. Edited by R. F. Milton & W. A. Waters. Edward Arnold (Publishers) Ltd., London. 2nd Edition, 1955. Pp. xi + 742. 70s.

It is at first sight significant that in the six years that have elapsed since the appearance of the first edition of this book sufficient new material has been forthcoming in the field to make the editors feel justified in enlarging the book by about 150 pages, but closer examination shows that this added material is almost entirely made up by two fresh sections, and the text carried over from the earlier edition shows little sign of any extensive revision. Some new references are given, and minor alterations occur from place to place, but without the addition of the new sections there would appear to have been little excuse for the presentation of a new edition with so meagre a ration of new material. This is perhaps a little unfortunate, for despite the impression that must result, advances have taken place in all branches of micro-analysis over the past six years, many of them of considerable significance. The reviewer cannot help feeling that a somewhat more vigorous revision might have accompanied the provision of the two new sections.

The first of these is, of course, chromatographic analysis, which was notably absent from the first edition, and which is now appropriately included as one of the major micro-analytical methods. The section is a useful introduction to all phases of the subject: to adsorption, partition and ion-exchange methods of separation, on columns and on paper. It is doubtful, however, if the space allotted allows it to stand comparison with some of the spate of monographs which have appeared recently, and anyone wishing to use the methods will almost certainly have to range further in his reading before long. Nevertheless, it is undoubtedly proper that a book with this title should contain such a section.

The other new section, on biological methods of microanalysis, has less competition to meet, since the collected literature on this subject is limited. Indeed, this summary of the present position in the use of biological methods of assay is most welcome, and ought to prove valuable, since the applications of this type of analysis are less well-known than they ought to be.

It is not likely that those chemists who already possess the first edition of this book will hasten to pay 70s. for what is in effect 150 pages of new material. Those who do not possess the first edition, however, will certainly find the book worth the money as a comprehensive introduction to the more important tested methods of quantitative inorganic micro-analysis.—CECIL L. WILSON.

METHODEN DER ORGANISCHEN CHEMIE. (Houben-Weyl). 4th Edition. Edited by Eugen Müller with the collaboration of O. Bayer, H. Meerwein and K. Ziegler. Volume IV, Part 2; Allgemeine Chemische Methoden. Georg Thieme Verlag, Stuttgart. 1955. Pp. xxviii + 1004. Moleskin, DM.152.

This part of the new 'Houben' differs in character from the three volumes which have already appeared (Vol. II, Vol. VII Part 1, and Vol VIII—reviewed in THE CHEMICAL AGE, 1953, **68**, 322; 1954, **70**, 1157 & 1262). It is really a collection of monographs on a number of general methods; many of the articles require systematic reading and are not very suitable for quick consultation. This is especially true of the first two sections, which deal with acid-base catalysis (H. Henecka) and catalysis involving complex ions (G. Hesse). It also applies to Professor K. Ziegler's stimulating article on macrocyclic compounds, to the excellent section on electrochemical reactions (E. Müller) and to the chapters on pyrochemical preparations (H. Koch) and biochemical reactions (B. Helferich, H. Stetter, J. Krebs and W. Reisner). However most of these articles are very well organised, and this, together with an excel-

lent index, ensures that research workers who consult 'Houben' in search of a solution to some particular preparative problem will find much useful information in this volume.

Nearly half of the book is devoted to various aspects of catalysis. The preparation of a very wide range of catalysts is described in detail (K. Wimmer) and there are two excellent articles on catalytic procedures (G. Schiller and H. Kröper). Much of the material in these chapters is derived from German patents, and concerns processes which have recently become of considerable industrial importance. The value of these articles is further increased by the inclusion of well-designed tables covering various catalysts and catalytic reactions.

An excellent chapter (F. Weygand and H. Simon) on the preparation of organic compounds containing isotopes deserves special mention. This discusses fundamental considerations as well as giving a number of detailed recipes; it also includes valuable tables (*ca.* 90 pages) which list known isotopic organic compounds.

The book maintains the high standard of clarity set in the previous volumes, and it is evident that the new 'Houben' deserves a place on the shelves of every chemical library.—J.C.P.S.

THE STRENGTHS OF CHEMICAL BONDS. By T. L. Cottrell. Butterworth's Scientific Publications, London. 1954. Pp. viii + 310. 30s.

There exist three significant experimental measures of the strength of a chemical bond. These are: (1) the bond dissociation energy; (2) the bond energy term; (3) the bond stretching force constant. Modern quantitative theories of valence, molecular structure, and reactivity, demand that each and all of these quantities be known accurately for as many bonds as possible. It is not surprising, therefore, that a large number of measurements of varying reliability has accumulated over the years. Reviews of various aspects of the subject have appeared from time to time. There has, however, been a great need for critical appraisal of the whole field, and, in particular, for a complete self-consistent table of bond energy values for organic molecules based on one accepted value for the heat of atomisation of graphite. Mr. Cottrell's book fulfils these requirements very adequately.

There is a useful introductory chapter on the general significance of the commonly used terms. This is well advised because, even today, the nature of quantities like bond dissociation energies and bond energy terms is not always fully appreciated. Subsequent chapters are devoted to more detailed discussion of the individual topics. The sequence is indicated by the following chapter headings: Definition, Measurement & Uses of Bond Dissociation Energies, Determination of Bond Dissociation Energies by Thermal Equilibrium methods, Determination of Bond Dissociation Energies by Kinetic Methods, Determinaton of Bond Dissociation Energies by Electron Impact & Spectroscopic Methods, The Definition, Determination & Uses of Bond Energy Terms, Heats of Formation of Organic Compounds, Heats of Formation of Inorganic Compounds & Heats of Atomisation of the Elements, Numerical Values of Bond Dissociation Energies, Numerical Values of Thermochemistry Bond Energy Terms, Other Measures of Bond Strength.

The book concludes with a comprehensive table containing accepted values for all the above bond strength quantities, and bond length data in addition. A complete reference list of the original literature is appended. There are no serious misprints. This is most important in such a work which will be used frequently in the laboratory as a reliable source of information on bond properties. The price is reasonable.—H. MACKLE.

BRITISH PLASTICS YEAR BOOK 1955. 25th edition. Iliffe & Sons Ltd., London. 1955. Pp. 652. 30s.

The latest edition of the British Plastics Year Book runs to 652 pages, about 50 more than the 1954 edition. The text has been revised and expanded to take in the new branches of the industry and the increased activities of established firms. There has been no major change in format, and the classification of the names and address section, divided into countries last year, has been maintained. The general subject index has also been retained.

The book gives the names and addresses of nearly 4,000 firms associated with plastics, and there is a Who's Who section, listing names and positions of prominent people in the British plastics industry. The annual review of patents now occupies a larger proportion of the book, in keeping with the developments of the industry.

HOME

Royal Visit to Refinery

The Queen and the Duke of Edinburgh visited the British Petroleum Company's oil refinery on the Isle of Grain, Kent, on 5 April. As reported in our issue last week (p. 807) the fifth platformer at the refinery recently went into commission.

Higher Fees for Trade Marks

Since 1 April higher renewal fees are charged for Trade Marks registrations due to expire after 30 June 1955; and after the latter date there will be a general increase in the fees payable in respect of a number of trade marks matters. The fees have remained substantially unchanged for many years despite considerable increases in administrative costs.

More Isotopes

During the past five years the use of radioactive instruments has increased threefold, Sir John Cockroft, director of the Atomic Energy Research establishment, said recently. The staff at Harwell were building a new research reactor to enable them to provide more radio isotopes of high quality, he added.

Achromycin Released

Under arrangement with the Ministry of Health, Achromycin, hitherto available only to hospitals under the National Health Service, may now be prescribed for all patients. It is released for this purpose as from 4 April. Achromycin is now manufactured by Lederle Laboratories Division, Cyanamid Products Ltd., at their factory at Hirwaun, near Aberdare, South Wales.

British Exhibition at Copenhagen

More than 500 firms will be represented at the British Exhibition to be held at Copenhagen from 29 September to 16 October. The exhibition is sponsored jointly by the British Import Union of Denmark and the Federation of British Industries and is being organised by the FBI's subsidiary, British Overseas Fairs Ltd. The total amount of space occupied by stands will be about 125,000 sq. ft., divided between the Forum and the Tivoli Gardens. The chemicals and pharmaceuticals section has been provisionally allotted 6,500 sq. ft., and the plastics section 3,500 sq. ft.

Institute of Metal Finishing Conference

Torquay is the venue of the Spring Conference of the Institute of Metal Finishing, to be held from 17 to 21 May. Papers will be presented under six main subject headings: chromium plating, alloy deposition, fundamental matters, papers of mainly practical interest, organic finishing and education for the metal finishing industry. Special functions include a works visit and an exhibition illustrating the subjects to be discussed. There will also be an art and photographic competition and a golf tournament. The conference is open to non-members of the Institute. Application forms can be obtained from the Conference Secretary, Institute of Metal Finishing, 32 Great Ormond Street, London W.C.1.

More Suggestions

Suggestions made by Fort Dunlop employees received £2,512 in merit awards last year, and the number received reached the record total of 2,638. They ranged from an idea for sweeping brooms to rubber curing by high frequency; and no fewer than 751 of them dealt with the prevention of accidents. Of the total 40 per cent were adopted and received awards and a further 20 per cent were given merit awards in appreciation of the efforts made.

New Style for BIF

The British Industries Fair is to be held at two different times of the year from 1956 onwards. The first show will be at Earls Court, London, from 22 February to 2 March. The second will be at Olympia, London, and Castle Bromwich, Birmingham, from 23 April to 4 May. The Earls Court section of the Fair in February will be for consumer goods such as toys and games, textiles and clothing, fancy goods, jewellery, stationery, leather and sports goods, whose main selling season is in the spring. Olympia will cater in May for exhibitors from other lighter industries such as packaging, chemicals and office appliances, and Castle Bromwich for heavier industries such as engineering and hardware. The changes may involve some adjustment between the industries showing in London and Birmingham.

OVERSEAS

Terylene in Milan

New British synthetic fabrics, such as Terylene, will be on show at the Milan International Samples Fair, from 12 to 27 April. They will be on the UK stand, organised by the Board of Trade and designed to call attention to the excellence in design and quality of the British textile industry.

Denmark & Argentina Sign Trade Pact

Surgical and precision instruments, paints, lacquers, chemicals, dyestuffs, drugs and pharmaceutical products will be among goods exported from Denmark to Argentina under the terms of a five-year trade and payments agreement between the two countries which came into force last month.

German Industries Fair

A German Industries Fair is to be held at Hanover from 24 April to 3 May. It will be devoted to the newest technical products, production processes and consumer goods and there will be more than 4,000 firms exhibiting.

More Aluminium Used

Uses for aluminium continue to grow, reports the chairman of Aluminium Ltd., the Canadian firm. In the past year the principal markets for the company's products were the United Kingdom (221,800 tons), the United States (192,560 tons) and Canada itself (80,000 tons).

Mexican Sulphur on the Way

Dr. Francisco Villagran, Mexican Consul-General in New York, estimates that 500,000 tons of sulphur will be produced in Mexico this year. Exports have just started, and the first shipment, of 3,500 tons, is destined for Britain.

Australian Refinery Capacity Grows

Australia's self-sufficiency in oil refinery capacity, which will be attained by the end of this year, will mean a direct saving of £A23,000,000 a year in foreign exchange. The benefits from the £A110,000,000 refinery construction programme are now becoming apparent. In 1953-54, refinery capacity reached 1,000,000 tons of crude oil; by the end of this year it will have reached 8,000,000 tons.

Sodium Silicate Produced in Cuba

Sodium silicate is being produced for the first time in the city of Sagua La Grande, Santa Clara Province, Cuba, from domestic materials. Cuba uses about 2,500 tons a year, mainly in the manufacture of soap, paint, paper, ceramics and cement.

Alkalis Council for India

An eleven-man development council for industry engaged in the manufacture of heavy chemicals (alkalis) has been set up by the Government of India under the Industries (Development and Regulation) Act, 1951. The council will recommend targets for production, co-ordinate production programmes, and review from time to time progress made by the industry.

Synthetic Fibres from Germany

European countries were the main customers for German synthetic fibres last year, Sweden, Austria, Denmark and the Netherlands being the chief importers. Exports from Germany between January and September, 1954, were worth DM.163,000,000, of which rayon accounted for DM.73,500,000.

SA Aluminium Plant Expansion

A sum of £250,000 is being spent this year by the Aluminium Company of South Africa on new equipment for producing aluminium extrusions at the company's Pietermaritzburg factory.

New Brisbane Carbonising Plant

The Brisbane Gas Company has recently installed a new carbonising plant at its gas works at Newstead, at a cost of £A500,000. The new equipment is the most modern of this kind of plant in Australia. Its rated daily capacity, with all retorts in operation, is 5,000,000 cu. ft. of gas. Other plant capacity at Newstead is 1,500,000 cu. ft. daily. Each of the 64 vertical retorts now in operation processes five tons of coal daily. The used coal is drawn off as coke, and the crude gas produced is condensed and purified before distribution. The coke is mechanically handled by a large belt conveyor to a screening plant which separates the coke into three grades for disposal.

· PERSONAL ·

The International Medal of the Society of Chemical Industry will be presented to PROFESSOR H. R. KRUYT of the Netherlands in the meeting room of the Royal Society, Burlington House, London W.1, on 18 April, when he will deliver his address. At the same meeting PROFESSOR R. DELABY of France and DR. P. GIUSTINIANI of Italy will be admitted honorary members of the society.

At Styrene Products Ltd., the plastics manufacturing company owned by Petrochemicals Ltd. and Erinoid Ltd., there have been some board changes following the acquisition of Petrochemicals by Shell Chemicals. MR. GODFREY H. OWTRAM, MR. E. J. BARNSLEY and SIR ROBERT ROBINSON, O.M., M.A., D.Sc., LL.D., F.R.I.C., F.R.S., all of whom recently resigned from the Petrochemicals board (see last week's issue, p. 809), have also resigned from the Styrene Products board. They have been succeeded by MR. A. D. KOELEMAN, MR. W. F. MITCHELL and MR. L. H. WILLIAMS, all of Shell. The Erinoid directors, MR. H. E. HARDEN and MR. J. HARVEY, remain on the Styrene Products board and MR. P. C. CHAUMETON, B.Sc., F.R.I.C., M.I.Chem.E., continues as managing director.

LORD HORDER, G.C.V.O., M.D., B.Sc., Hon. D.C.L. (Dunelm), Hon. M.D. (Melbourne and Adelaide), F.R.C.P., has accepted an invitation to be nominated as the new president of the National Smoke Abatement Society to succeed SIR ERNEST SMITH, C.B.E., D.Sc., F.R.I.C., F.Inst.F. Sir Ernest's two-year term of office ends in September, when the society's annual conference will be held.

DR. Z. E. JOLLES, D.Sc., Dr. Chem., D.Pharm., has been appointed to the board of Leda Chemicals Ltd., as research director.

DR. E. G. WOODROOFE, B.Sc., Ph.D., has been appointed head of the Research Division of Unilever in succession to DR. H. J. CHANNON, C.M.G., B.A., D.Sc., who has resigned. The director of Unilever Ltd. and Unilever NV responsible for research division and technical division will be MR. J. A. CONNEL, B.Sc.

MR. D. G. RANDALL, B.Sc. (Eng.), M.I.Chem.E., A.F.Inst.Pet., has now resigned as technical director and consultant to the Process & Chemical Engineering Co. Ltd. Since he ceased active association with the company last year he has been, and is, practising as a design and chemical engineering consultant, c/o Weinreb & Randall Ltd., 70 New Oxford Street, W.C.1.

The first director of the British Glass Industry Research Association, DR. RONALD GORDON NEWTON, took his Ph.D. and D.I.C. at Imperial College, London, and later worked on the physiology of latex for the Rubber Growers' Association. Entering the Research Association of British Rubber Manufacturers in 1938 as a research assistant, he was appointed head of the Research Division in June 1940. Towards the end of 1948 he joined the British Rubber Producers' Research Association and in November 1949 was seconded to Malaya. In November 1950 he returned to Europe to be appointed as the co-ordinating officer for Technically Classified Rubber on behalf of the International Rubber Research Board. In July 1953, Dr. Newton was appointed deputy secretary of the International Rubber Research Board and the International Rubber Development Committee.

DR. JAMES CRAIK, M.A., B.Sc., Ph.D., whose appointment as chairman of the Nobel Division of I.C.I. was announced last week (p. 810), had been managing director of the Division since 1953. A Scot, he was educated at St. Andrews University and was later awarded a Commonwealth Fellowship which took him to Cornell University in the United States. He joined I.C.I. in 1927 as a chemist in the research department of the Explosives Group (now Nobel Division) at Ardeer.

MR. RICHARD C. FENTON, M.A., and MR. JOHN A. RODGERS, A.S.A.A., A.C.I.S., have been appointed directors of Pfizer Ltd. Mr. Fenton's election to the board comes only three months after his promotion to vice-president in charge of the parent Pfizer Corporation's European operations. He joined

Pfizer as British branch manager to help initiate activities here in 1951, and became regional director for Europe in 1952. Mr. Rodgers has been in charge of Pfizer's British activities as manager for the last two and a half years. He is an accountant and, before joining the pharmaceutical firm, was secretary of a group of companies for a number of years.

MR. D. J. SAUNDERS, B.Sc. (Eng.), A.F.R.Ae.S., formerly a principal scientific officer in the Rocket Propulsion Department of the Ministry of Supply, has joined the Compoflex Co. Ltd. as chief development engineer (hydraulics). While with the MoS, he was employed on the development of rocket motors, with particular reference to high-speed centrifugal pumps for propellant supply, and on the development of such ancillary hydraulic devices as flowmeters and propellant valves.

The well-known business man MR. KENNETH HORNE, sales director of Triplex Safety Glass Ltd., will resign from his present position after this year's British Industries Fair to become full-time managing director of the Fair. He is at present one of the six directors of British Industries Fair Ltd.

Art director of the British Colour Council, MR. ROBERT F. WILSON, was the Council's representative at the first world congress on the prevention of industrial accidents in Rome from 2 to 6 April.

MR. A. HOLROYD, A.M.I.Chem.E., sewage works manager, Wolverhampton, has been appointed a member of the Water Pollution Research Board of the Department of Scientific and Industrial Research. He succeeds DR. S. H. JENKINS, D.Sc., F.R.I.C., who has completed his term of office. Mr. Holroyd has previously held posts at Dagenham and Southend. He is the author of a number of papers dealing with the dynamics of the aeration of water. He took up his appointment, which is tenable for a period of four years, on 1 April.

MR. J. V. KLEIN, joint managing director of Compoflex Co. Ltd.—manufacturers of flexible tubes and hoses—began a three-week visit to continental markets on Sunday, 3 April. He is spending most of his time in Holland, Belgium and Italy.

Sunvic Controls Ltd. announce that they have appointed MR. W. F. DORMAN as a technical representative in the London and Home Counties area for their Scientific and Industrial Divisions. MR. F. C. CHAVENTRE will be their technical representative in the same area for the process control division. MR. D. M. GILL has been appointed technical representative in the North West England area for the process control division, and MR. F. N. YATES technical representative in the same area for the scientific and industrial divisions.

MR. ALBERT A. SWINBANK, chief accountant to the I.C.I. Terylene Council at Harrogate, has been adopted as Conservative candidate for the Bilton Ward in the forthcoming Harrogate municipal election. The retiring Conservative, Councillor R. Schofield, is not seeking re-election because of pressure of business.

Obituary

The funeral took place on 1 April of DR. FRANZ KIND, Ph.D. (Vind.), who had died on the previous Sunday at the age of 52. Dr. Kind was one of the first to bring the policy of 'home refining' to Britain. He played a major part in establishing Manchester oil refinery, which came into operation in 1938. Later, in 1945, he helped to pioneer the introduction of chemicals from petroleum into this country. A graduate of Vienna University, he worked for some years on the Continent, but when war broke out concentrated on making the best use of the new Manchester oil refinery for the war effort.

For some time Dr. Kind worked in close association with Dr. Weizmann on the development of a process for the production of aromatics and olefines by vapour phase catalytic cracking of petroleum distillates. In 1940 this research showed very encouraging results and a few weeks after Dunkirk it was decided to build a pilot plant at Manchester oil refinery to develop the process further. The results were promising, and out of this concerted work Petrochemicals Ltd. emerged at Partington, near Manchester, as the first large-scale plant using the 'Catarole' process.

After the war Dr. Kind worked at reconstructing European refineries, and in 1948 helped to form a new company in Italy, of which he became vice-president, to cope with the rapidly increasing demand for refinery capacity.

Monsanto Mexicana

FROM A SPECIAL CORRESPONDENT

MONSANTO Chemical Company of America is looking into possibilities of expansion in the chemical field in Mexico. Mr. Edgar M. Queeny, chairman of the board, Mr. R. Cole, senior vice-president, and Mr. Edward A. O'Neal, manager of the overseas division, are conferring with Senor Enrique Uhthoff, president of Monsanto Mexicana, about expansion of the company's Lecheria plant, and the possible building of a new chemical production unit.

While plans are still in preliminary stages, there is every evidence that Monsanto plans a considerable expansion of its Mexican operations within the next five years. For the present, the firm is considering a 4,000,000 peso investment ($320,000) in production of chemicals for the textile industry.

Not Heavy Chemicals Yet

According to Senor Uhthoff, Monsanto Mexicana will not enter the heavy chemicals field 'for the moment.' The Mexican subsidiary, inaugurated with the opening of the Lecheria plant with an investment of 12,000,000 pesos (then $1,395,000) in 1951, is the largest plastics plant in Mexico. Operating capital is now 20,000,000 pesos ($1,600,000) and the factory has received Monsanto's international award for efficiency of production, safety and cleanliness.

The local firm produces polystyrene, vinyl and acetate plastics from primary materials produced and imported from Texas City, Texas. The plastics customarily are sold in bulk to manufacturers of products ranging from kitchenware and toys to industrial hose, electric wire and paints.

A number of compounds have been developed by the Mexican plant, according to Senor Uhthoff, for special application within the republic. A vinyl film for raincoats may be produced cheaply enough to bring this rainy weather accessory within the reach of the mass market within a few years.

Apart from production the subsidiary also sells a wide range of products imported from its plants in the US, from agricultural insecticides to plywood glues for Yucatan's lumber industry. As soon as the Mexican market is big enough, these products will be produced in Mexico.

'We are laying plans for a sound expansion,' said Mr. O'Neal, 'but we don't want to forge ahead of the market.' The Mexican operation is also studying possibilities of exports to Europe. Similar plans have been considered some time ago but shelved due to unusually high export duties. Now export may again be possible due to the present administration's policy of encouraging exports through reduction of duties.

Monsanto Mexicana has played a major role in the development of the plastics industry in the republic and the firm's technicians provide advice and even extend credit to prospective manufacturers of plastics products. This follows the policy of the parent company in the US of being a producer of prime materials used by other manufacturers.

Applications research is carried out in Mexico and Mexican chemical engineers are periodically sent to the US for special training. Only one American engineer is employed by the subsidiary.

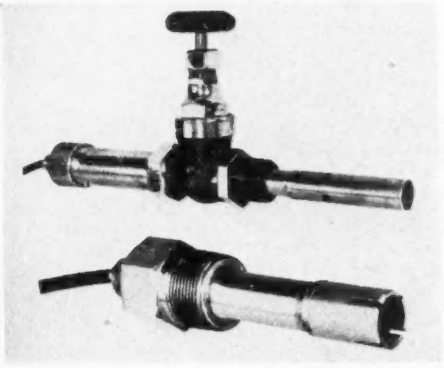
Sales volume in Mexico is growing at 'a quite satisfactory rate,' Mr. O'Neal said, thus paving the way for the expansion programme which, aside from building up Monsanto's production, will aid in the establishment of new manufacturing industries and co-operate in the joint industrial-agricultural expansion programme of the government.

Institute of Metals to Meet in Oxford

The Oxford local section of the Institute of Metals, in collaboration with the Metal Physics Committee of the Institute, is holding an all-day meeting in the lecture theatre of the Clarendon Laboratory, Parks Road, Oxford, on Friday 15 April. The morning session, beginning at 11 a.m., is being devoted to an informal discussion on 'Fatigue'. At 2.30 p.m. there will be a Brains Trust session at which questions will be put to members of the Metal Physics Committee. The meeting is open to non-members without ticket.

Publications & Announcements

FOXBORO-Yoxall Ltd., Lombard Road, London S.W.19, have recently added to their range two conductivity cells, known as Models GC and GB, which embody a number of new features designed to give improved conductivity measurement when used in conjunction with the Foxboro Electronic Dynalog. This instrument is notable among industrial conductivity measuring instruments by reason of its 1,000 cycle measuring circuit which has the effect of practically eliminating the incidence of polarisation. The new cells are of the insertion type for mounting in a pipeline or the side of a tank. Type GC is designed with an assembly including an integrally mounted gate valve and fittings so that the cell may be removed



for inspection and cleaning without interrupting the flow of the process. Type GB is similar in design but is not equipped with the valve. Both cells will screw in to a standard 1¼ in. pipe. The GC and GB cells are each made in constants of 1.0, 0.1 and 0.01, and employ carbon electrodes instead of the more familiar metallic type which has always had an unsatisfactory feature in that it requires platinising before and during service. If it is left with a smooth surface polarisation will occur, so the surface has to be roughened by coating the electrode with platinum black. In service this coating wears off and the cells must be periodically withdrawn for replatinising. The new Foxboro carbon electrodes have the same surface properties with regard to polarisation as the platinised metallic electrode, but have the advantage of needing no initial or subsequent platinising. The new cells have been designed for easy dismantling with the carbon electrodes accessible for the periodic cleaning which is the only attention they require. The body of the cell is of particularly robust construction and the design ensures an absolutely leakproof seal, even under high pressures, where the cable enters the cell. The new cells are normally supplied in stainless steel and are designed to operate at temperatures up to 105° C and pressures up to 150 psi. If it is necessary to operate at higher temperatures or pressures, or in the presence of fluids liable to attack stainless steel, specially adapted cells are available according to the requirements of the particular application.

* * *

A PROBLEM frequently encountered in the control of bulk material handling is the difficulty of diverting the flow of material from one duct to another. Following their policy of progressively improving design, Dallow Lambert & Co. Ltd., Spalding Street, Leicester, have recently introduced a modified two-way control valve for use in dust control systems, the KC valve. It can be used with all types of dusts, chippings, wood waste, etc., and will operate fitted in any position. Basically the device consists of a 'Y' piece containing a metal chute which can be pivoted to direct the flow of gas and material as required. The profile of the chute has been designed to present minimum resistance to the flow, the flow path through the valve being smooth and regular; this fact minimises any tendency for build-up of solids to occur in the valve. The branch of the valve isolated by the chute is effectively sealed by the chute seating on a durable flexible plastic joint. Where fibrous materials are being handled with the possibility of material clinging to the edge of the chute during change-over, the flexibility of the plastic joint enables a dust tight seal to be maintained round the obstruction until the next change-over allows the material to be carried clear. The mechanism for operating the valve is spring loaded and can be operated by either hand or remote control; it gives a rapid positive action which prevents the chute from taking up a position in which neither branch of the valve is sealed. All parts of the valve are readily accessible, and

[continued on page 867

PERMUTIT

ION EXCHANGE MATERIALS

At their South Wales factory, Permutit manufactures a wide range of ion exchange materials in granular, bead and membrane form. Some of these materials are used in large quantities for water softening and water demineralising: others are employed to a growing extent for many purposes outside the field of water treatment. A few of these applications are listed below:—

Purifying solutions from electrolytes, such as sugar, glucose, fruit juices, pectin, gelatine, lactic acid, etc.

Removal of required products from solutions, such as antibiotics, amino acids, alkaloids, vitamins, rare earths, etc.

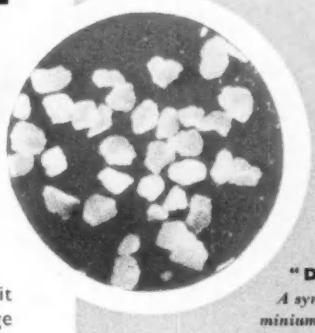
Purifying effluents to remove obnoxious or valuable constituents, such as cuproammonium effluent, coke oven liquor, chromic acid swill water, phosphoric acid pickling liquor, fixing baths, chromium and cadmium plating baths, etc.

Chemical analysis, such as the removal of interfering ions, the preparation of very pure solutions, the rapid determination of metals, etc.

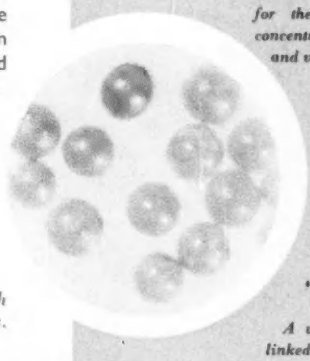
Permutit ion exchange materials may supply the answer to many of your process problems. We shall be happy to advise you if you will consult us.

●

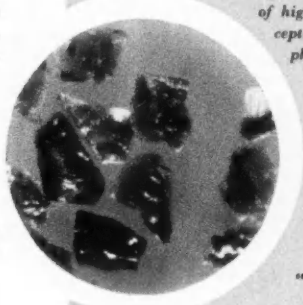
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"DECALSO" (x 7)
A synthetic sodium aluminium silicate suitable for the separation and concentration of hormones and vitamins.

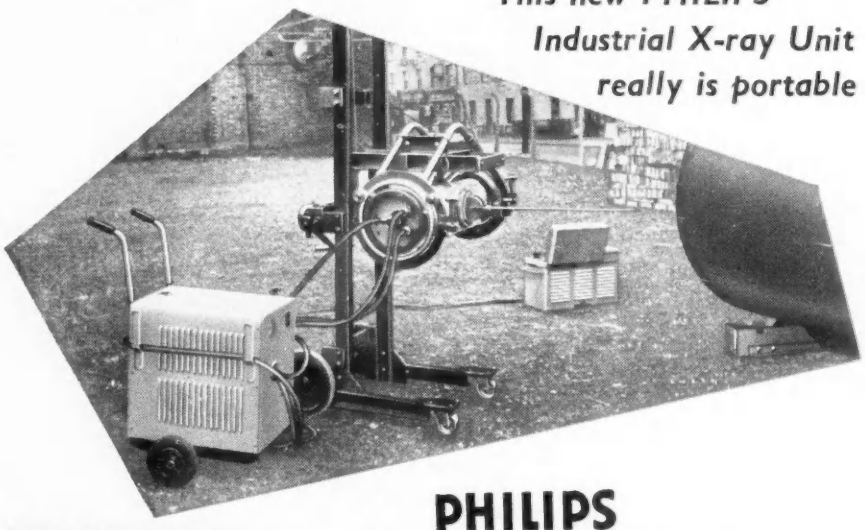


"ZEO-KARB 225" (x 10)
A unifunctional cross-linked sulphonated polystyrene resin in bead form of high capacity and exceptional chemical and physical stability.



"ZEO-KARB 215" (x 15)
A nuclear sulphonated phenol resin containing also hydroxyl groups.

This new PHILIPS Industrial X-ray Unit really is portable



PHILIPS Compactix 150

LIGHTWEIGHT · SELF-CONTAINED · VERSATILE
GENEROUSLY RATED · READILY ASSEMBLED



1 TUBE HEAD : easily man-handled weighs only 211 lb.



2 CONTROL UNIT : simple to operate— completely safe : weight 145 lb.



3 TUBE HEAD and CONTROL UNIT : transportable by motor car !

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Publications & Announcements

continued from page 864

consideration has also been given to the design of the chute pivot bearings which are self lubricating and require no attention. It is made in a range of sizes to fit ducting of 4 in. to 22 in. diameter.

* * *

SIXTH Annual Report by the Board of Trade on the operation of the Monopolies and Restrictive Practices Acts, 1948 and 1953, has been published by HM Stationery Office, price 9d. The report covers the calendar year 1954 and includes a survey of subjects suggested to the Board of Trade during the year for reference to the Monopolies and Restrictive Practices Commission. Since the end of 1954, further developments have been announced on two of the matters referred to the Monopolies Commission. First, the Commission have completed their report on the supply and export of various semi-manufactures of copper and copper-based alloys. Secondly, the Government have announced that they accept the Commission's conclusions that the practices described in the Commission's report on the process of calico printing operate, and may be expected to operate, against the public interest, and that they are in general agreement with the Commission's recommendations. The industry has been so informed and discussions are to be held with it as to the best way of carrying out the recommendations.

* * *

THE latest report by The United Steel Companies Ltd. to their employees says that the year which ended last September was a remarkable one in the firm's history. It saw the production of nearly 2,500,000 tons of steel, a record figure and one which is greater than that achieved by any other steel company in the country. The year has marked the end of a phase. With the completion of the new blast furnace plant at Appleby-Frodingham, the development plans agreed at the end of the war have been completed, but new schemes have replaced them and development is not at an end. A review for employees of the past year's activities and progress has been published for each of the last five years. Each has reported improving results and steady development of the company's resources. Among the 11 concerns in The United Steel Companies Ltd. is United Coke & Chemicals Co. Ltd., Rotherham.

* * *

THE first vessel designed especially for the bulk transport of liquid chemicals recently made its maiden voyage. The SS *Marine Dow-Chem*, of 18,000 tons, is under charter to the Dow Chemical Company of the USA. She will carry 11 different chemicals in 24 centre tanks, having a capacity of over 3,500,000 gal. With wing tank capacity added her capacity will be about 5,000,000 gal. Four of the tanks near the stern have been designed to carry 73 per cent caustic soda, for which heat must be applied to maintain a temperature of about 110° C. Solid nickel or nickel-clad steel was used for every piece of equipment coming into contact with the caustic soda. The *Marine Dow-Chem* will operate between the Dow Chemical Company's works at Freeport, Texas, and ports at Bayonne, New Jersey, and North Charleston, South Carolina. These facts are given in an article in *Wiggin Nickel Alloys, No. 31*, produced by Henry Wiggin & Co. Ltd., Thames House, Millbank, London S.W.1. The publication also contains a description of a range of suction pyrometers, produced by Land Pyrometers Ltd. (Queen's Road, Sheffield 2) for measuring the temperature of hot gases in surroundings which are either much hotter or much colder than the body of the gas. These pyrometers are designed for all temperatures up to 1,600° C. To avoid the thermocouple being affected by the temperature of the walls of the gas holder it is surrounded by several concentric radiation shields. The convective heat transfer from the gas to the thermocouple is increased by aspirating some of the gas at high speed past both the thermocouple and radiation shields.

* * *

DESIGNED for use with spray guns or compressed air tools, the Drummond compressed air oil and moisture extractor traps the oil or moisture and discharges it to a drain while dry air is delivered from first starting up. Intended for fitting in the air line near the outlet, it is entirely automatic and once fitted needs hardly any further attention. The extractor is described in an illustrated leaflet prepared for the manufacturers, Drummond Patents Ltd., 5 Great Winchester Street, London E.C.2, by Samson Clark & Co. Ltd., 57-61 Mortimer Street, London W.1.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

MINERALS SEPARATION LTD., London E.C.—1 March, deed supplemental to Trust Deed dated 17 December, 1954, securing £500,000 debenture stock (inclusive of £250,000 secured by said Trust Deed), present issue £250,000; general charge. *Nil. 9 June, 1954.

SOLARTRON LABORATORY INSTRUMENTS LTD., Thames Ditton.—1 March, guarantee, further securing to Coutts & Co. all moneys due or to become due to the bank from Solartron Electronic Group Ltd. and secured by a charge dated 8 February, 1955; general charge. *£5,101. 21 November, 1952.

SOUTHERN INSTRUMENTS LTD., Camberley.—25 February, further deed of variation supplemental to a debenture dated 22 December, 1948, etc., to Industrial & Commercial Finance Corporation Ltd.; charged on specified properties and a general charge (subject to, etc.). *£23,500. 13 October, 1953.

Satisfactions

BRITISH CELANESE LTD., London W.—Satisfactions, 26 February, of debenture stock registered 2 October, 1943, and 8 November, 1944, to the extent of £1,420 and of debenture stock registered 24 September, 1946, to the extent of £868.

New Registrations

Copras Chemical Co. Ltd.

Private company. (546,006.) Capital £1,000. Manufacturers of and dealers in chemicals, cleaning materials, detergents, etc. Directors: Sidney E. Jones and Phyllis M. Jones. Secretary: A. H. Hamer. Reg. office: Copperas House Mill, Tormorden, Yorks.

Blythe Colour Works Ltd.

Blythe Colour Works Ltd. have had a record trading year, and the chairman, Mr. D. R. Wildblood, says in his annual review that the directors look forward to the future with 'quiet optimism and confidence.' Consolidated net profit before taxation was £357,574, the highest ever.

Company News

Olin Mathieson Chemical Corporation

Current expansion programme of Olin Mathieson Chemical Corporation involves expenditure of an estimated $50,000,000, says the annual report issued recently. The programme includes the building of a second cellophane plant at Olin, Indiana, which will be completed in 1956. Net earnings of the corporation and its subsidiaries in the US and Canada during 1954 were $34,292,000, an increase of nearly 14 per cent over the 1953 earnings. Net profits amounted to $38,584,000, compared with $32,894,000. The report says that industrial chemical operations for the year were at satisfactory levels and that sales of agricultural chemicals increased. Olin Mathieson Chemical Corporation resulted from the merger of Olin Industries Inc. and Mathieson Chemical Corporation on 31 August, 1954 (see THE CHEMICAL AGE, 1954, **71**, 342).

Albright & Wilson Ltd.

Group profit, before tax, of Albright & Wilson Ltd. for the year ended 31 December, 1954, amounted to £1,876,289, compared with £1,786,068 according to the preliminary statement. Profit after tax deductions was £884,487 (£746,230). A 15½ per cent final ordinary dividend is recommended to the annual meeting on 26 May. This will make a total payment of 22½ per cent (17½ per cent last year).

Brush Group Ltd.

Sales income of the Brush Group Ltd. in 1954 was slightly more than in 1953, according to the preliminary statement of accounts. Net profit, before tax, increased from £884,231 to £1,221,576 and after tax from £322,230 to £530,032. A final dividend of 7 per cent, making a total of 10 per cent (6 per cent last year) is to be recommended at the annual meeting on 19 May.

Next Week's Events

WEDNESDAY 13 APRIL

Institution of Chemical Engineers

Chester: Grosvenor Hotel, 7 p.m. 'Engineering in Chemical Plants' by O. W. Murray (joint meeting with Institute of Petroleum and SCI).

THURSDAY 14 APRIL

Institute of Physics

London: 47 Belgrave Square, S.W.1, 10 a.m. Opening of Education Group annual conference (also on 15 April).

Institute of Fuel

London: Institution of Civil Engineers, Great George Street, S.W.1, 5.30 p.m. 'Field Tests to Evaluate the Performance of Free-standing Convector Fires with Restricted Throats' by M. Davison, D. E. Kimber and R. E. J. Tulett (BCURA).

FRIDAY 15 APRIL

Chemical Society

St. Andrews: Chemistry Department, The University, 5.15 p.m. 'Polymerisation of the Vinyl Ethers' by Professor D. D. Eley.

Oil & Colour Chemists' Association

Manchester: Engineers' Club, Albert Square, 6 p.m. Annual general meeting.

Society of Dyers & Colourists

Manchester: Textile Institute, 10 Blackfriars Street, 6.30 p.m. Annual general meeting, followed by '"Courpleta", the Dyeing and other Properties of Triacetate Filament Yarn and Staple' by J. Boulton.

Institution of Chemical Engineers

Birmingham: The University. Annual symposium of Graduates & Students' Section under the general title 'Law and Management for the Chemical Engineer' (also on 16 April).

SATURDAY 16 APRIL

Institution of Chemical Engineers

Manchester: College of Technology, 3 p.m. 'Researches into Factors Affecting the Performance of Electro-precipitators' by J. R. A. Lakey and W. Bostock.

Market Reports

LONDON.—Activity in the chemicals market has been fairly well maintained and export inquiry remains good. With the approach of the holiday week the movement to the home consuming industries against contracts has been on a smaller scale, but on the other hand new business in fertilisers has improved. Firm price conditions prevail in most sections of the market. There is a ready market for most of the coal tar products with creosote oil, carbolic acid and the naphthalenes firm on good demand.

MANCHESTER. — Contract deliveries of most chemical products to users in the Lancashire area during the early part of this week were maintained at a reasonably good level, but traders on the Manchester market were expecting the usual cessation of business in the latter part of the week and in the early days of next week. With the exception of the cotton textile and allied industries, prospects are for a continued steady demand from most outlets. Business in fertiliser materials has continued on an improved scale and this is likely to go on over the next month or so. A steady demand for carbolic acid, creosote oil, and the light distillates are features of the tar products section.

GLASGOW.—A more or less steady week's trading has to be reported for industrial chemicals, with orders received being against normal requirements. The demand for agricultural chemicals is showing a steady increase, with orders being placed for forward delivery. A good volume of inquiries are still being received for export, and the market in general is very active.

Fertiliser Factory Planned

THE question of location of new fertiliser units in the country is engaging the attention of the Government of India. The Minister for Production stated that a decision had been reached to start a factory capable of producing 300,000 tons of ammonium sulphate per annum at Nangal. This factory would in addition produce heavy water required for atomic energy work in India. A committee is touring the States of Bombay, Madras and Rajasthan with a view to decide on the location of yet another fertiliser plant. It has been pointed out in favour of the last-mentioned State that there are enormous resources of gypsum and also of brown coal. Furthermore bitterns from Sambhar lake, containing sodium sulphate, besides sodium carbonate and chloride, may also be made use of in the process. A final decision is awaited.

CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

THE INSTITUTION OF CHEMICAL ENGINEERS

EXAMINATIONS 1955

THE present Examination will be held for the last time in 1955.

Particulars of this and the new Examination, together with application forms which are returnable by the 1st June, 1955, may be obtained from: The General Secretary, **THE INSTITUTION OF CHEMICAL ENGINEERS, 56, VICTORIA STREET, LONDON, S.W.1.**

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 ***inclusive, or a woman aged*** 18-59 ***inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,*** 1952.

ABLE **ENGINEER** required as Maintenance and Construction Engineer for light chemical plant. Candidates should be Graduates or A.M.I.Mech.E. and aged 28-40 years; have had minimum of five years' experience in the chemical industry.

Person appointed will be directly responsible to the Chief Engineer.

A generous Pension Scheme is in operation.

Reply, giving details of education, qualifications and summary of career, to:

CHIEF ENGINEER,
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EXPERIMENTAL OFFICERS (minimum age 26) required at Ministry of Supply Establishment in S.W. England for experimental work on research and small-scale development of chemical processes. Qualifications: Higher School Certificate (Science) or equivalent but possession of higher qualifications such as a degree may be an advantage. Experience in semi-technical operations desirable. Salary within range £715 to £880. Women somewhat less. Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting F.190/5A.

CHEMICAL PLANT MANAGER is required by well-known and progressive Chemical Manufacturing Company in S.W. Lancashire. The successful applicant will probably be between 23 and 35 years of age; hold a University degree or an equivalent qualification; have had some industrial experience; possess unlimited energy, drive and the personal qualities required to manage effectively.

The initial salary will be commensurate with age, qualifications and experience, in the range £650 to £850 per annum.

Please send full particulars of qualifications, positions held, age, etc., quoting Ref. P.51, to Personnel Manager, **BOX No. C.A. 3398, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

SITUATIONS VACANT

IMPERIAL SMELTING CORPORATION require **PATENTS OFFICER** for duties on patent specifications in development work. Applicants should have a knowledge of statistics and preferably possess a degree in Chemistry, Metallury or Chemical Engineering. Experience of abstrating and French/German translation would be advantageous. Applications, with full details, to Personnel Manager, Imperial Smelting Corporation, Limited, St. Andrew's Road, Avonmouth, nr. Bristol, quoting reference **PAT/CA.**

NORTH THAMES GAS BOARD invite applications for the undermentioned vacancies from **CHEMISTS** and **PHYSICISTS** who have obtained a 1st or 2nd Class Honours Degree.

1. At the Chemical By-Products Works, Beckton, East Ham, E.6, for research on problems connected with coal tar distillation, and the manufacture of phenols, naphthalene and bases.
2. At Watson House, Fulham, S.W.6, for research into the fundamental problems of utilisation and combustion of gases, particularly for space-heating, cooking, water-heating and industrial appliances.

Preference will be given to those who have had some post-graduate experience in research, particularly in subjects related to those mentioned above.

These are permanent appointments and offer good prospects of advancement. Successful candidates will be required to join the Staff Pension Scheme. Starting salaries will be according to age and qualifications.

Applications, giving age and full details of training and qualifications, should be addressed to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, London, W.8, to reach him not later than 14 days after the publication of this advertisement, quoting reference 666/234.

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY,
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BERKS,
requires a
SENIOR SCIENTIFIC OFFICER
or
SCIENTIFIC OFFICER,

for work on the design and development of plant for a special process involving the assessment of fundamental physico-chemical data, flowsheeting of processes and design of experimental and pilot equipments therefrom. Applicants should have a First- or Second-Class Honours Degree in Chemical Engineering or in Chemistry or in Engineering with a Chemical Engineering Diploma. Experience of the solution of fluid flow problems and with liquid phase separations would be an advantage.

SALARY.—Senior Scientific Officer: £1,040 to £1,205 per annum (male). Scientific Officer: £505 to £905 per annum (male), assessed according to age, qualifications and experience. The successful applicant will be required to join the Authority's Contributory Superannuation Scheme.

HOUSING accommodation will be available within a reasonable period for married staff who live outside the radius of the Establishment's transport facilities. During this period lodging allowance may be payable to a Scientific Officer.

Send postcard for application form to:

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ROTARY DRIER by Vernon of Paris, 30 ft. long by 4 ft. diam. construction, riveted ¼ in. steel plate, running on two roller paths. Flange bolted in two halves, fitted internal flights. Motor-driven through girth gear and pinion. Fan, cyclone and parts of furnace available.

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PATENTS

THE Proprietor of British Patent No. 630,142, entitled "**METHOD AND APPARATUS FOR DISTILLING CARBONACEOUS MATERIAL,**" offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to **SINGER, STERN & CARLBERG, 14 E. JACKSON BOULEVARD, CHICAGO, ILLINOIS, U.S.A.**

PATENTS

THE Proprietor of Patent No. 599,683, for "**IMPROVEMENTS RELATING TO THE MANUFACTURE AND UTILISATION OF COLD-SETTING POLYHYDRIC PHENOLIC ALDEHYDE ADHESIVES,**" desires to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

THE Proprietor of British Patent No. 614,006, for "**A METHOD AND MEANS FOR PRODUCING LIQUID OXYGEN OR LIQUID AIR RICH IN OXYGEN,**" desires to enter into negotiations with a firm or firms for the sale of the patent, or for the grant of licences thereunder. Further particulars may be obtained from MARKS & CLERK, 57 and 58, Lincoln's Inn Fields, London, W.C.2.

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